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ABSTRACT

This unit focuses on a dramatic moment in the Renaissance from about 1420 when Filippo Brunelleschi single handedly created, defined, and engineered a new architecture by building the great dome of the cathedral of Santa Maria del Fiore in Florence. The dome became the symbol of Florence's grandeur during the Renaissance, and a model for great public buildings. Brunelleschi was among the first to undertake a systematic study of ancient Roman architecture both as a model of the architectural grandeur that he felt had been lost during the Middle Ages, and as a model for spatial organization and large-scale engineering that had been forgotten in Western Europe. He combined his new found knowledge of Roman design and building techniques with his own vision, defining a new aesthetic for his own era. One of the great monuments of western architecture, the dome provides a model for a whole tradition of grand public building. It represents a classic case study of the interaction between the collective energies of a community and the genius of an individual. By studying Brunelleschi's grand vision for the dome to crown the cathedral, the economic and political background against which his dream became a reality, the great competition organized by the city for the commission to build the dome, the engineering challenges which had to be overcome, and the impact of Brunelleschi's work on future generations, students will begin to understand and appreciate the creative surge which took hold in Florence and other parts of Italy during the Renaissance. Contains 11 references. (Author/DK)

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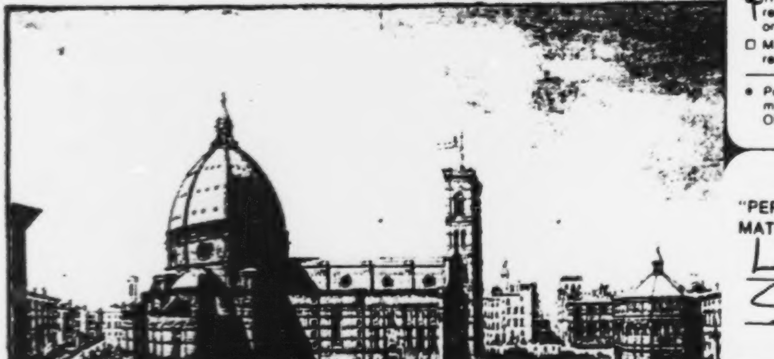
ED 376 098

CROWNING THE CATHEDRAL OF FLORENCE: BRUNELLESCHI BUILDS HIS DOME

A UNIT OF STUDY FOR GRADES 7 - 10
Written by Linda Symcox
Illustrated by Carole Collier Frick
University of California, Los Angeles



The Cathedral and Baptistry during the procession of Corpus Domini

NATIONAL CENTER FOR HISTORY IN THE SCHOOLS
A Cooperative Research Program of the
University of California, Los Angeles,
and the National Endowment for the Humanities

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For information on additional teaching units and other resources from the Center, please write:

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APPROACH AND RATIONALE

By Linda Symcox

The National Center for History in the Schools has developed the following collection of lessons for teaching **Crowning the Cathedral of Florence: Brunelleschi Builds His Dome**. Our units are the fruit of a year-long collaboration between history professors and experienced teachers of both United States and World History. They represent specific "**dramatic moments**" in history from which you and your students can pause to delve into the deeper meanings of selected landmark events and explore their wider context in the great historical narrative.

In our approach, the continuing narrative provides the context in which the dramatic moment is situated. By studying a crucial turning-point in history, the student becomes aware that choices had to be made by real human beings, that those decisions were the result of specific factors, and that they set in motion a series of historical consequences. We have selected dramatic moments that best bring alive that decision-making process. We hope that through this approach, your students will realize that history is an ongoing, open-ended process, and that the decisions they make today create the conditions of tomorrow's history.

Our dramatic moments are based on **primary sources**, taken from documents, artifacts, journals, diaries, newspapers and literature from the period under study. As you know, a primary source is a **first-hand** account of any event in history. For example, the telecast or the script of a speech would be a primary source. A secondary source is a **second-hand** account of an event. This would be, for example, the newspaper account of the speech the next day or a newscaster's report about the speech. All historical accounts, such as textbooks, are by their very nature secondary sources. What we hope to achieve using primary source documents in these lessons is to remove the distance that students feel from historical events and to connect them more intimately with the past. In this way we hope to re-create for your students a sense of "being there," a sense of seeing history through the eyes of the very people who were making decisions. This will help your students develop historical empathy, to realize that history is not an impersonal process divorced from real people like themselves. At the same time, by analyzing primary sources, students will actually practice the historian's craft, discovering for themselves how to analyze evidence, establish a valid interpretation and construct a coherent narrative in which all the relevant factors play a part.

CONTENT AND ORGANIZATION

Within this unit, you will find: 1) **Teacher Background Materials** and 2) **Lesson Plans** with **Student Resources**. This unit, as we have said above, focuses on certain key moments in time and should be used as a supplement to your customary course materials. We have chosen to pitch the various lessons on different grade levels and they can usually be adapted to a slightly higher or lower level.

The **Teacher Background** section should provide you with a good overview of the entire unit and with the historical information and context necessary to link the specific **Dramatic Moment** to the larger historical narrative. You may consult it for your own use, and you may choose to share it with students if they are of a sufficient grade level to understand the materials.

The **Lesson Plans** include a variety of ideas and approaches for the teacher which can be elaborated upon or cut as you see the need. These lesson plans contain student resources which accompany each lesson. These resources consist of primary source documents, any handouts or student background materials, and in many cases, a bibliography for the unit.

In our series of teaching units, each collection can be taught in several ways. You can teach all of the lessons offered on any given topic, or you can select and adapt the ones that best support your particular course needs. We have not attempted to be comprehensive or prescriptive in our offerings, but rather to give you an array of enticing possibilities for in-depth study, at varying grade levels. We hope that you will find the lesson plans exciting and stimulating for your classes. We also hope that your students will never again see history as a boring sweep of inevitable facts and meaningless dates but rather as an endless treasure of real life stories, and an exercise in analysis and reconstruction, rather than rote memorization.

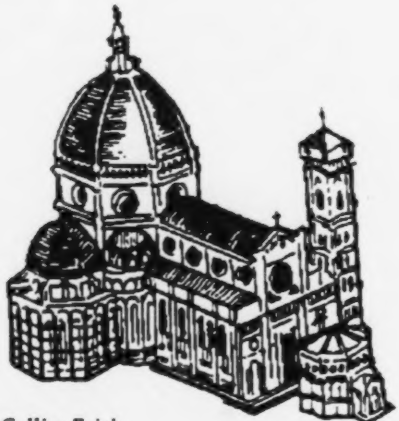
A DRAMATIC MOMENT

BRUNELLESCHI WINS THE COMPETITION

In 1418 the city of Florence held a competition to choose an architect to design the great dome of their new cathedral. The dome would be bigger than any dome built since ancient times; constructing it on such a scale posed problems of design and engineering that no architect before had had to confront. Many different architects came forward with designs but the city authorities judged none of them satisfactory.

Filippo Brunelleschi, a Florentine architect, had been studying this problem for years and had arrived at an answer; but for fear that others would steal his secret, he would not explain it to the authorities. Giorgio Vasari, Brunelleschi's biographer, then tells us a legendary tale to show how Brunelleschi won the contest.

> ***"Filippo proposed to the architects that whoever should make an egg stand upright on a flat marble surface should build the dome, as this would be a test of their ability. He produced an egg and all the architects tried to make it stand but no one succeeded. Then they passed it to Filippo, who gently took it, broke the end with a blow on the marble and made it stand. And so it was resolved that he should be put in charge of the work, and he wrote on a sheet of paper a brief outline of his plan."***



Illustrated by Carole Collier Frick

I. UNIT OVERVIEW AND RATIONALE

This unit focuses on a dramatic moment in the Renaissance from about 1420 when Filippo Brunelleschi single-handedly created, defined and engineered a new architecture by building the great dome of the cathedral of Santa Maria del Fiore in Florence. Brunelleschi was one of the most innovative architects of all time. His dome not only became the symbol of Florence's grandeur during the Renaissance, but it immediately became a model for great public buildings, both religious and secular, until the present time. Brunelleschi was among the first architects or artists of the Renaissance to undertake a systematic study of ancient Roman architecture both as a model of the architectural grandeur which he felt had been lost during the Middle Ages, and as a model for spatial organization and large-scale engineering which had been forgotten for close to a millennium in Western Europe. (Islamic and Byzantine architecture had never lost sight of these models.) He combined his new-found knowledge of Roman design and building techniques with his own vision of architectural splendor, defining a new aesthetic for his own era.

You might stop here to question what is the point of taking your classroom time to study the building of one particular dome, in a remote Italian city, many hundreds of years ago, by an architect that most people have never heard of. First of all, the dome is one of the great monuments of western architecture. Secondly, it provides a model for a whole tradition of grand public building down to the present day. Thirdly, it represents a classic case study of the interaction between the collective energies of a community and the genius of an individual.

Brunelleschi's dome was the culmination of the Florentine citizens' long drawn effort, beginning in the late thirteenth century, to build a great cathedral worthy of their city's rapidly growing wealth and international power. As a matter of fact, the cathedral became the symbol of Florentine power. By studying Brunelleschi's grand vision for the dome to crown the cathedral, the economic and political background against which his dream became a reality, the great competition organized by the city for the commission to build the dome, the engineering challenges which had to be overcome, and the impact of Brunelleschi's work on future generations, students will begin to understand and appreciate the creative surge which took hold in Florence and other parts of Italy during the Renaissance.

Architecture is, by its nature, the most public of all of the arts. It requires huge amounts of money as well as the marshalling and organization of collective energy on a large scale. The final product dominates public spaces and determines their character for centuries. By following the dramatic story of one man's architectural genius and perseverance within its political and social context, students can understand the complex relationships between the creative individual genius and the collective effort of society as a whole. Neither can work without the aid of the other.

II. UNIT CONTEXT

To teach this unit the teacher must stop the clock for a moment before resuming the study of the Renaissance. In this way students can delve deeper into the topic and achieve a greater understanding of the era. On a chronological time line the unit would be placed in the first half of the time-span usually identified as the Renaissance in European history, approximately from 1400 to 1550.

Brunelleschi's architectural work should be placed in the broader context of the great works of literature, painting, sculpture and science which were created by his contemporaries. The story of Brunelleschi's achievements must be taught emphasizing at all times the economic and political context in which he operated. As we mentioned earlier, architecture requires great financial investment, unlike writing or painting, and students must therefore understand the role that Florence's rich and powerful woolen guild and the community played in financing his work. Any great architectural or engineering project is a very costly and complex effort and therefore requires an enormous economic infrastructure and the social and political organization to make it work. Florentine society in the late fourteenth and early fifteenth century possessed the wealth, pride and political will to foster Brunelleschi's great endeavor.

III. UNIT OBJECTIVES

1. To study primary source documents and architectural renderings in order to participate directly in the learning of history as professional historians do.

2. To understand the complex links and tensions between the individual genius and society.

3. To understand the importance of classical models as an inspiration for the Renaissance artist, and the way in which artists re-worked them to create a new kind of art.

4. To appreciate the 200-year sustained communal effort to build the great cathedral.

5. To understand the lasting architectural influence of Brunelleschi's great dome: i.e. how his dome influenced other projects glorifying communal prestige.

6. To appreciate the technical and artistic innovations that were necessary for building the dome.

7. To understand why certain great structures are the expression of the economic and political forces which brought them about.

IV. INTRODUCTION TO CROWNING THE CATHEDRAL OF FLORENCE: BRUNELLESCHI BUILDS HIS DOME

By Geoffrey Symcox

This unit is about the city of Florence and the greatest architect it produced in the early Renaissance, Filippo Brunelleschi; it is the story of the interaction between the community and the individual genius who summed up its aspirations, expressing them in a monumental form that still moves and delights us today. It is also the story of how this creative interaction between artist and community set a pattern for later ages. Brunelleschi's achievement in giving physical expression to the pride of his fellow-citizens echoes down to the present day in other great communal enterprises: the U.S. Capitol in Washington D.C., and the dignified state houses and capitols across the land, are links in this tradition of grand public architecture conveying a political message.

BRUNELLESCHI AND THE RENAISSANCE

Florence was the cradle of the Renaissance. Perhaps we should begin by defining what that term means. The word itself was coined by the philosophers of the fifteenth century, or humanists as they called themselves, to describe their sense of living in a new period of history, distinct from the middle ages: a new era which sought consciously to revive the values and artistic forms of classical antiquity, and live by them. This does not mean that the humanists and artists of the fifteenth century rejected the Christian philosophy of the middle ages, or the teachings of the Bible and the Church fathers: far from it. But they sought to supplement the Christian cultural tradition with the reborn culture of classical Greece and Rome. They called themselves : "humanists" because they were engaged in "the study of the humanities" (studia humanitatis), their name for the disciplines of classical literature and philosophy: Plato and Cicero now became their guides to living a good and just life, along with the Bible and St. Augustine.

And just as writers and philosophers tried to recreate the style of classical literature, artists and architects like Brunelleschi tried to recapture the look and scale of ancient art. What they produced, however, was by no means a slavish imitation of ancient models: rather they reinterpreted classical forms—the column, the dome, the rounded arch— and analyzed the proportions of classical buildings in order to create an entirely new art and architecture. The art of antiquity — which for them meant essentially that of ancient Rome, since Greece was geographically remote and largely unknown — became the starting point for the development of a new classical tradition. Brunelleschi was one of the pioneers who laid down the canons of this new aesthetic. A look at the buildings he designed makes clear how much his style owed to classical antiquity, and at the same time how much it differed from it. Compare the colonnade of his orphanage in Florence, begun 1419, (See *Figure Seven* on page 66) with the Roman ruins in the Étienne Dupérac engraving, (See *Figure Two* on page 52) or a well-known monument like the Coliseum: the basic motif of repeated round arches is the same, but the scale, the detailing, the delicate feel are very different. And to understand how far Brunelleschi is from the Gothic architecture of the middle ages, just compare the round arches, simple proportions based on the geometry of squares and hemispheres, and sparse ornamentation of the orphanage with the soaring proportions, pointed arches and rich sculptural detail of a great Gothic cathedral like Chartres, or Notre Dame in Paris. It is at once clear that a new artistic era has dawned.

Brunelleschi's dome is one point of transition from the Gothic tradition to the architecture of the Renaissance. Its inspiration is obviously classical; it is the fruit of the years Brunelleschi and his friend Donatello, the leading pioneer of revived classicism in sculpture, spent studying the ruins of ancient Rome. The city then — as today — was a vast museum of ancient art and architecture. From it Brunelleschi learned to build on a grand, monumental scale, and further developed his mechanical and engineering skills. Vasari's biography tells us that he studied the great dome of the Pantheon (1st-2nd centuries AD, See *Figure Four* on page 63) and examined the structural techniques that the Roman builders had employed to vault huge public bath houses and basilicas. Armed with this knowledge he returned to Florence (in about 1418) and won the competition to build the largest dome that Europe had seen since classical antiquity.

Europe's great Gothic cathedrals had used complex systems of vaulting to roof their naves, but had hardly ever used domes, except in Italy, where the classical tradition had never been completely forgotten. The nearby cathedrals of Pisa and Siena with their central domes served as models for Florence's new cathedral, but the Florentines wanted to surpass these rivals, and build a dome that would outshine theirs. To construct a dome of this size required a series of breakthroughs in engineering, both to ensure the solidity of the dome itself, and to support it during construction. Brunelleschi overcame these problems by devising a radically new structural system, which combined elements of both ancient and Gothic building techniques. The brickwork, as Vasari notes, was based on Roman models, but the eight stone ribs that support the dome and give it its characteristic shape are essentially Gothic, recalling the ribs of the vaults in countless medieval churches, though on a grander scale. The tall external silhouette of the dome is Gothic too, reminiscent of the pointed arches found in every Gothic cathedral, and clearly different from the proportions of the Pantheon dome or the hemispherical vaults of a Roman bath-house. But within this outer shell of the dome, built high to dominate the city and its surrounding territory, Brunelleschi placed another dome, to be seen from inside the cathedral. In part this was for structural reasons: the two domes support one another. But it was also for aesthetic effect. Brunelleschi — who also invented the system of linear perspective that artists soon adopted as the standard mode for representing three-dimensional reality on a two-dimensional plane — realized that the tall outer dome would appear too tunnel-like to an observer looking up at it from the floor of the cathedral, and needed to be shallower and easier on the eye. His dome thus makes its effect through a system of double perspective: its soaring external bulk dominates the space around it, while from inside it presents a harmonious, reassuring space that moves but does not completely dwarf the spectator. While much of the dome's structure is Gothic, therefore, its spatial organization derives from the new science of mathematical perspective which is the spatial convention of Renaissance art.

A final point should be made here about Brunelleschi's role as architect. His work on the dome was part of a cultural process of re-defining the status of the artist and the idea of creativity. In the middle ages artists and architects operated within the craft and guild tradition; creativity and execution were not clearly separated functions, and the artist rarely enjoyed high social status. With Brunelleschi and the architects of the early Renaissance creation and design began to be considered a function apart from the actual construction. A division was beginning to appear between the architect who formulated the design, and the craftsman who translated it into concrete form: between mind and hand, between the world of intellect and the physical world. The profession of architect became ennobled by being associated with the liberal arts and intellectual pursuits; in a Platonic sense it came to be considered a function of the mind, more socially elevated than manual labor and the mechanical arts, with which it had been identified up to then. In Brunelleschi's work on the dome of Florence cathedral we can observe the beginnings of this process: the creative artist begins to distinguish himself from the craftsmen who labor under his direction. Brunelleschi was still closely involved in every stage of the dome's construction, and constantly devised solutions to technical problems, but his role was that of a directing intelligence supervising the work and delegating the execution to others. It is significant that from this time we begin to know artists and architects by name, whereas in the middle ages most had remained anonymous. The individual artist was now acquiring enhanced status. A new era had begun in the relationship between artist and society.

THE CITY OF FLORENCE: SOCIETY AND POLITICS

Historians have been attracted to the study of Florence for many reasons. One obvious motive is the city's cultural achievement, symbolized by the names of Dante, Giotto, Petrarch, Bocaccio, Brunelleschi, Ghiberti, Donatello, Fra Angelico, Botticelli, Leonardo da Vinci, Michelangelo, to list only the best-known. Another reason is the city's economic importance. In the thirteenth century it rose to prominence as one of Europe's leading industrial and commercial cities, and retained that position for three centuries. Yet another reason is the city's fascinating political development; from an independent republic in the twelfth century it evolved into an oligarchical regime dominated by the Medici family after 1434, and finally into a princely state ruled by the later Medici as Grand Dukes. It remained an independent state until the unification of Italy in 1860. Between the fourteenth and the sixteenth centuries, because of its wealth, Florence exercised political influence in Italy and across Europe out of proportion to its small size. The city's history can be reconstructed in great detail from the enormous amounts of documentary source-material preserved in its archives, going back to the twelfth and thirteenth century. One example of the rich sources available for the study of Florence's past is the great tax-survey or catasto of 1427, which contains the names, family background and financial data for the entire population of the city and its dependent territory, totalling over a quarter of a million persons. This document is almost without parallels in European history until the nineteenth century. (It has recently been analyzed with the aid of the computer by David Herlihy and Christiane Klapisch: see bibliography). Source materials like the catasto make the Florentine archives a gold mine for historians, and increase the fascination of studying the city's past.

In the late eleventh century the cities of northern and central Italy asserted their independence from the authority of the feudal barons and bishops who had ruled them since the fall of the Roman empire. The cities' growing commercial wealth enabled them to break free and establish themselves as self-governing republics, or "communes," ruled by the most powerful families that lived within their walls. As trade developed in the Mediterranean world, spurred by the Crusades, the Italian cities prospered still more. Venice, Genoa and Pisa dominated the trade to the eastern Mediterranean, and established ties with the trading town of Flanders and Germany. Milan emerged as a manufacturing center. Siena in the thirteenth century became the hub of a banking network with operations in many parts of Europe. The cities of northern and central Italy thus came to form the heart of the European commercial economy, serving as the connecting link between the more highly developed Byzantine and Islamic worlds, and the vigorously growing economy of northwest Europe.

By about 1200 Italy north of Rome was a patchwork of hundreds of independent city-states competing fiercely with each other for supremacy. Gradually the larger cities conquered and absorbed the smaller ones, forming bigger regional states: by the early fourteenth century Milan dominated the north Italian plain, and Florence would eventually establish its dominion over most of Tuscany. The internal political life of the Italian city-states was polarized by endless feuds between the great families that ruled them, like Shakespeare's Montagues and Capulets. Slowly the strongest and most ruthless of these clans rose to dominate their cities, ousting or destroying their rivals. By the early fourteenth century most of the formerly independent communes had fallen under the sway of local despots, the prototypes of Machiavelli's *Prince.*

Florence developed according to this general pattern, but in its own distinctive way, and on a somewhat later time-scale than most of the other important Italian city-republics. It did not emerge into prominence until the thirteenth century, having been overshadowed until then by its more precocious neighbors, Pisa and Siena. But by the mid-thirteenth century Florence was growing fast and extending its hold over the surrounding territory. Its population increased rapidly, as immigrants from the countryside settled in the city seeking a better life and wider economic opportunities. This supply of cheap labor stimulated the development of the woolen cloth industry which, along with the proceeds from efficient agriculture in the surrounding region, formed the basis of the city's prosperity. Florence's rise was also aided by its rivals' misfortunes. Pisa's power was gradually undermined by long commercial wars with Genoa, while Siena's rich banking houses overextended themselves and ran into serious difficulties by the last decades of the century. At that point a group of Florentine families began to take over their functions, first as bankers to the Pope, and soon to the kings of France and England. By the beginning of the fourteenth century Florence was one of the richest and most powerful cities in Italy, and in the whole of Europe, with a population of around 100,000 — enormous for the period — and a far-flung network of trade and financial connections stretching from England and the Iberian peninsula to the eastern Mediterranean. Florentine cloth manufacturers imported high-grade wool from as far away as England and Spain, and their products conquered a leading place in the European market for luxury textiles. Florentine bankers were the confidants of Popes and kings, and reaped enormous profits from their international operations. It was in this climate of fast-growing wealth and boundless confidence that the citizens of Florence around the year 1290 determined to build a grand new cathedral worthy of their city's wealth and power, bigger and better than those of its Sienese and Pisan rivals. This was the start of the great enterprise which would be crowned more than a century later by Brunelleschi's achievement in building the largest dome in Europe since ancient times.

The decision to build the new cathedral was also motivated by political factors; it marked a critical moment in the evolution of the Florentine city government, and the triumph of the guilds and commercial interests over the old semi-feudal clans that had originally ruled the city. Endless feuds between the great families had lacerated the city since the foundation of the Florentine commune in the early twelfth century. With their bands of retainers they tyrannized the lesser folk in a continual cycle of arrogance and brutality. But in the middle of the thirteenth century things began to change. The magnate families' perpetual violence was increasingly seen as an obstacle to the development of a stable economic life in the city. New wealth from trade gave greater power to the middling sort of men, who organized themselves in trade and craft guilds, and formed militias to resist the magnates. In 1282, after a long struggle, they took control of the city's government and promulgated a new series of ordinances outlawing magnate violence, and restricting government offices to members of the guilds. In the next few years the city government was reformed: supreme executive power was vested in a committee of six magistrates (called Priors), elected for a two-month term. Other committees — also with frequently rotating membership to discourage the monopoly of power by individuals — handled the other functions of government. Behind them the guilds exercised powerful but informal influence over the government through their directing councils. They frequently assumed an independent role in politics, as also in artistic patronage. The powerful wool manufacturers' guild was the moving spirit behind the reconstruction of Florence's cathedral.

This was the culmination of a process that had overtaken most of the other Italian communes earlier in the century. In Florence the guilds' conquest of power came later, and was not followed, as soon happened elsewhere, by the rise to dominance of a single family or strongman, as the guilds' ascendancy disintegrated in rivalry and factionalism. The Florentine guilds — soon divided into a hierarchy of the "greater" ones devoted to large-scale manufacturing, long-distance trade and banking, and the "lesser" or craft guilds — maintained their hold over the city government. They were in fact an oligarchy, excluding from power the magnate families who refused to come to terms with them and accept at least token guild membership, and the laboring masses who toiled in the many branches of the textile industry.

By about 1290, therefore, a new political order had taken shape in Florence, and the ascendancy of the trading interests was assured. These political and constitutional changes were reflected in a great burst of building activity. Besides the plan for the new cathedral, the government ordered the construction of a new town hall, and new city walls. Both still stand today. The town hall, or Palazzo Vecchio, was erected on a site confiscated from one of the great feudal families banished from the city for its lawlessness; it is a tall, fortified building more like a castle than the municipal offices we are accustomed to. Its rough stone walls and battlements reflect the violence and instability of political life in Florence, as in every other medieval Italian city-state. Its imposing bulk symbolizes the authority of the new regime. The new city walls were built soon after, to accommodate the city's swelling population, which had now far outgrown the earlier circuit of walls constructed less than a century before. All of these great projects seem to have been the work of a single architect, Arnolfo di Cambio, who was also a noted sculptor. Florence's wealth and new-found political power helped give rise to a cultural flowering that would lead directly into the Renaissance. Arnolfo was only one of a galaxy of talent that burst forth at this time: the poet Dante (ca 1265-1321) and the painter Giotto (ca 1266-1337), who would build the elegant bell-tower for the new cathedral, were part of the same generation of founding geniuses who established the primacy of Florentine culture in Italy.

Palazzo Vecchio Florence, Italy, ca 1290. Fratelli Alinari, Art Resource, NY, NY.

Florentine politics, and the construction of the new cathedral, did not proceed smoothly in the succeeding century. Externally the city was continually at war with its neighbors, as it gradually extended its territory. Internal political life was kept in constant turmoil by the bitter rivalries of the city's commercial families, who frequently made use of the same violent methods that the feudal magnates had employed in the past to achieve their ends. Economic life suffered a severe downturn in the 1330s when the kings of France and England defaulted on the loans they had contracted with the big Florentine banking firms. Then the terrifying epidemic of the Black Death struck in 1348, reducing the city's population by at least a half, and paralyzing its economic life for a time: markets shrank, trade was disrupted, and the scarcity of labor forced wages higher. The first great period in the construction of the new cathedral, signalized by the completion of Giotto's bell-tower in about 1340, came to a halt.

The later fourteenth century was a period of recurring economic and political crises. Repeated visitations of the plague further decimated the city's population, until by the first decade of the fifteenth century it had reached its lowest point, and stood at roughly a quarter of its level a century before. In 1378 a revolt by the disenfranchised textile workers temporarily overthrew the guild government, which had used its power to keep down their wages. When the old form of government was restored a few years later, power rested more firmly than ever in the hands of the greater guilds, which now in effect excluded the minor guilds from power. Economic instability had meanwhile aggravated the conflicts between the major Italian city-states, which by now had subjugated most of the smaller cities. For a decade and more at the end of the fourteenth century Florence was engaged in a desperate struggle with Milan, which was seeking to extend its domination from northern into central Italy. Even after Milan's bid for hegemony had been defeated, other threats remained. Florence was constantly at war, spending great sums to maintain armies to fight its rivals and extend its own territories. The tax-survey of 1427 was occasioned by a financial crisis brought on by this constant warfare; in it the Florentine government conducted a systematic enquiry into each of its subjects' wealth, in order to proportion the added burden of taxation to their ability to pay.

Amid these political upheavals and this climate of economic depression, work on the new cathedral resumed and new plans were made. It is somehow astonishing that when the definitive version of the project was decided by the government and the guilds that were financing it in 1368, the plan was made larger and more grandiose than ever. It was as if the citizens were deliberately defying fate, and affirming their pride and confidence in the face of the disasters that were threatening to overwhelm their city. They were also making a sublime gesture of faith in human ingenuity: at the time they drew up their new scheme, they knew that it was beyond the skill of any architect to span such a great space, but they still persisted in fixing its dimensions on a heroic scale. They were striving to establish their city's fame for all time as a community that could achieve the impossible. And in due time, they were proved right. Brunelleschi, one of their fellow-citizens, nurtured in the Florentine tradition of rational enquiry and disciplined imagination, solved the problem they had set for posterity, and created a monument to communal confidence that has been emulated ever since.

V. LESSON PLANS

1. Geography and Demography

2. The Challenge

3. The Building of the Dome

4. The Lasting Image of the Dome

GEOGRAPHY, DEMOGRAPHY AND TIME

A. Objectives

1. To locate Italy on a map of Europe, as well as the other major European cities which traded with Florence.

2. To identify these cities as the major trading partners of Florence and as a source for her great wealth.

3. To locate the Cathedral of Santa Maria del Fiore on a street plan of Florence and to appreciate the centrality of its position in the city.

4. Similarly, to identify the location of a key public building in the students' own community, town, state and country, using progressively expanding maps.

5. To construct a time line coinciding with the beginnings of the church in 1290 and its completion in 1482. (Note that the cathedral is to this day incomplete. The facing around the base of the dome was never completed and the facade was added as late as the nineteenth century.)

6. To appreciate the sustained civic enterprise required to build a great cathedral over 200 years.

7. To appreciate the decimation of the population by the Black Death of 1348 and recurrent epidemics after that.

8. To learn to read different types of architectural drawings.

B. Lesson Activities (One Day)

1. Read the **DRAMATIC MOMENT** to the class and tell them that they will be studying one of the greatest engineering and artistic feats ever, the construction of the **dome** over the Cathedral of Santa Maria del Fiore in Florence. Explain that the cathedral was begun about 1290 and not finished until 1482, taking nearly 200 years to complete. This prolonged project was typical for cathedral construction at that time.

2. Have students construct a time line beginning and ending with the dates of the church construction. Have students find the mid point of the time line and write the year 1400, approximately half way between the beginning and the end of construction. Tell them that they will be adding events to the time line as they progress through our story.

Sample Timeline

1290	**Beginning of Cathedral**
1348	**Black Death**
1400	
1482	**Completion of Cathedral**

3. Using a map or atlas have students locate Italy, Paris, London, Flanders, England and Spain on a map of Europe. Explain that these are the main cities and regions that Florence traded with and were the source

of her vast wealth. (See *Map I.*)

4. Have students locate the Republics of Florence, Venice and the Papal capital of Rome on the map of fifteenth century Italy. (See *Map II.*)

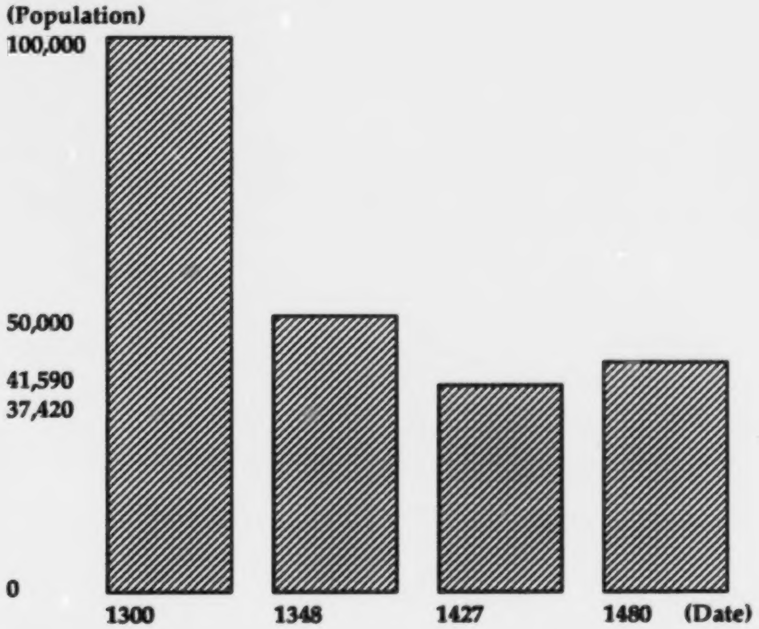
5. Have students locate the cathedral on a street plan of Florence. (See *Map III.*)

6. Read the **STUDENT BACKGROUND ONE**.

7. Students should plug in the Black Death of 1348 on their time lines.

8. Have students make a bar graph of the population of Florence in 1300, 1348, 1427, and 1480. (If they have access to a computer, perhaps they can make a computer generated bar graph.) Have them draw inferences about the fluctuations in population.

Sample Bar Graph



9. Hold a discussion on the background material referring to the "Sample Questions," in part D of these instructions. (Make sure to go over pronunciation of difficult words.)

10. Have students analyze the plan of the cathedral in order to understand what Brunelleschi's task would be.

11. Define vocabulary terms in notebook.

Note to the Teacher

You may choose to have students begin a notebook or journal for the whole unit. They can reproduce their time lines, provide illustrations for the unit and define their vocabulary words. When they are finished they will have a convenient book for review.

C. Extended Activities

1. Compare the population of your town with that of Renaissance Florence.

2. Compare the population of Florence with other major cities of the time.

3. Locate your house, church or civic center on a street plan for your district. Next locate your town within your state and your state on a U.S. map.

4. Draw an architectural plan of your house or of any building which interests you.

5. Compare the Street Plan of Renaissance Florence, (See ***Map III***), with any U.S. city. Note the walls on the Florentine map. Why do U.S. cities not have walls?

D. Sample Questions to Facilitate Discussion

1. What were the bases of Florentine wealth in 1290?

2. Discuss the length of time and stages in building a great cathedral in pre-modern times.

3. Discuss the effects of the Plague on the construction of the church.

4. What would be a modern equivalent of The Plague? Are we still vulnerable to epidemics?

5. What was the engineering challenge in the building of the cathedral that appeared in 1412?

6. Do we expend similar effort on cathedrals today in the U.S.? (The cathedral of St. John in New York was recently completed after about one hundred years.)

7. Do today's great buildings occupy the center of the city and focus its plan as Florence's did?

E. Vocabulary

1. architect
2. Filippo Brunelleschi (fēē-lee-poh brew-nell-ēsk-ee)
3. Florence
4. thirteenth century
5. Black Death
6. dome
7. decade
8. century

9. Giotto (jōt-oh)
10. Flanders
11. Mediterranean
12. medieval

F. Evaluating the Lesson

1. Evaluate students' map work.

2. Run a continuing check of students' time lines throughout the unit.

3. Evaluate students' bar graph.

3. Informal evaluation of class discussion.

FILIPPO BRUNELLESCHI & FLORENCE

Every so often in history the creative genius of one person changes the lives of the people around them. You might be thinking of people like George Washington, Abraham Lincoln, Sojourner Truth, Thomas Edison or Madame Curie. This is the story of one such person, an **architect** called **Filippo Brunelleschi** who worked in **Florence,** Italy during the early 1400's. He was a man of such great vision and engineering genius that he created a new style of architecture that lives on to the present day.

By the later **thirteenth century** the city of Florence was very rich. Much of its wealth came from the agriculture of the surrounding countryside. In addition it was rapidly becoming one of the wealthiest manufacturing and banking centers of Europe. The basis of the city's wealth was the manufacture of high quality textiles woven from wool imported from as far afield as Spain and England. Other types of cloth were imported from Flanders, and dyed and finished in Florence for export all over the Mediterranean world. The wealth accumulated from manufacturing permitted many Florentine families to enter the banking business and by now they were lending large sums to the Popes and to foreign rulers like the kings of France and England. Florence was on the way to becoming the financial capital of Europe.

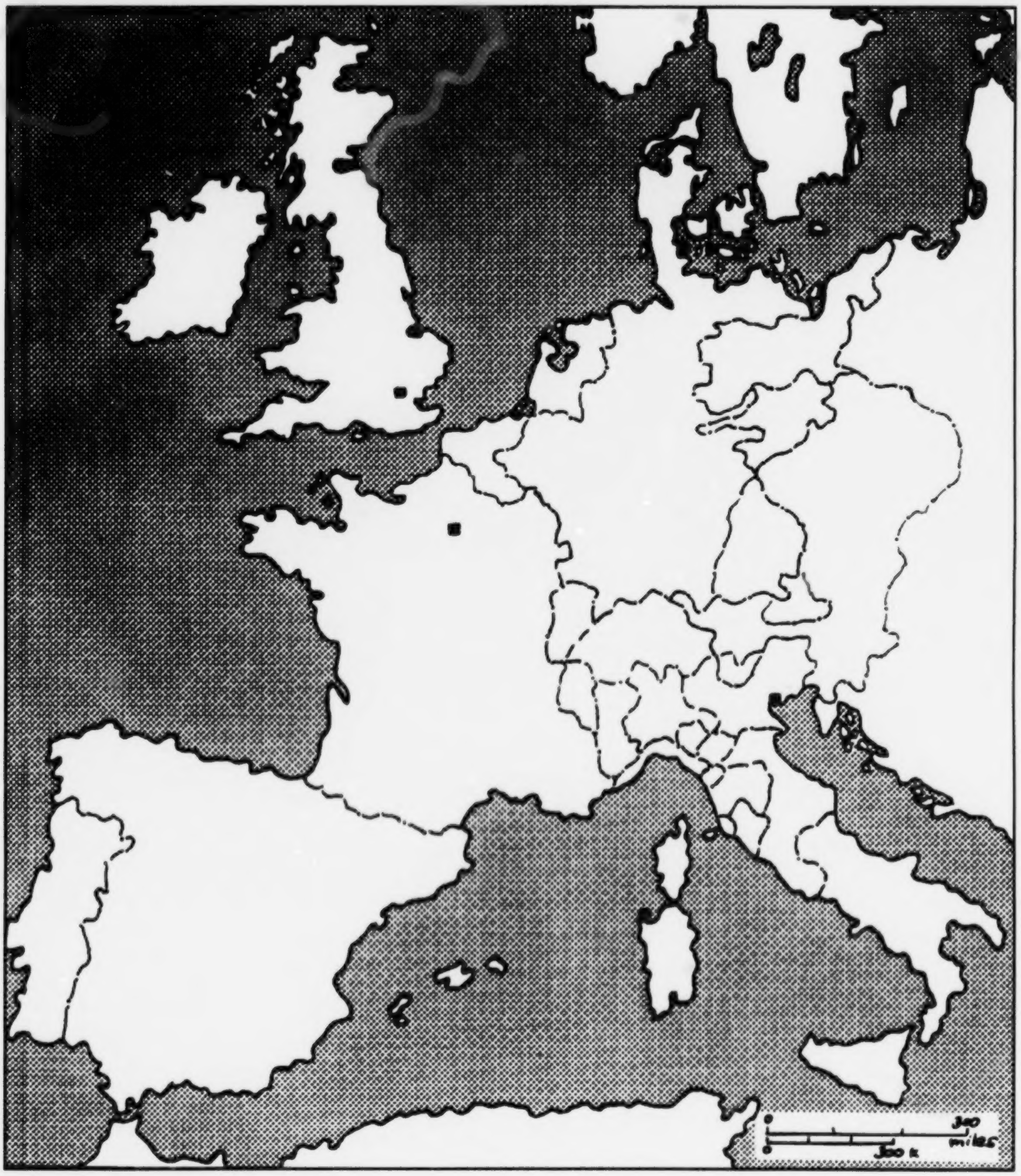
The leading citizens of Florence were feeling so proud and had so much money that they naturally wanted to erect great monuments of lasting beauty. Thus in 1290 Florence began to demolish her old rundown cathedral in order to build a much larger and greater one, worthy of the city's sense of its own power and prestige. From the very beginning, the cathedral became the crowning symbol of Florentine greatness and power. Thus the city embarked on a project that would last nearly 200 years and would span the lives of several great architects. This fabulous cathedral would be finished in 1482 and would forever change the way the city of Florence looked.

What makes this story particularly dramatic is that in 1348, the **Black Death,** (Bubonic Plague) struck Florence along with the rest of Europe. The Black Death reduced the population of Florence by at least 50%, from about 100,000 in 1290 to perhaps 50,000. In addition, successive waves of Plague struck Europe throughout the fourteenth century, reducing the population still further. By 1427 the population of Florence was only 37,420. (We know this because the Florentine government conducted a complete and very accurate census in that year.) At the time the dome was completed, in 1482, the population had recovered to 41,590. Through all of these setbacks the project carried on because it was of such great importance to the citizens of Florence. They always found workers to build their great cathedral.

By about 1400, after more than a century of intermittent construction, the cathedral was finished except for the dome. All of the walls were in place, and the body of the cathedral was roofed. It was flanked by a separate bell tower designed about 1330 by the great artist **Giotto di Bondone** This tower was a tall thin medieval tower faced with colored marble and decorated with sculptures; around its lower level were reliefs depicting craftsmen at work. (See **STUDENT BACKGROUND ONE,** ***Figure One***.) The Florentines were very proud of their cathedral and by 1412 they were ready to enclose the great opening to the sky. (See ***Figure Two***.) They knew that this dome would have to be the largest built in Western Europe since the Ancient Romans in terms of sheer size and they wanted it to be the greatest in terms of beauty and design. How confident the citizens must have been in man's ingenuity to spend 110 years building a cathedral without having the slightest idea of how to roof it. At this time they had no technical knowledge of how to build a dome of such great height and weight, large enough to span the 130 foot wide open space and yet light enough so that it wouldn't cave in on itself. They would have to hold a competition to see if anyone could figure out this great challenge.

As you will see in Lesson Two, there was one man alone who had a vision of what the dome should look like and the ability to engineer its construction. He was a unique and creative thinker and his work would make the cathedral one of the greatest monuments on earth, change the skyline of Florence forever, and change the way architects would design buildings from that time on.

EUROPE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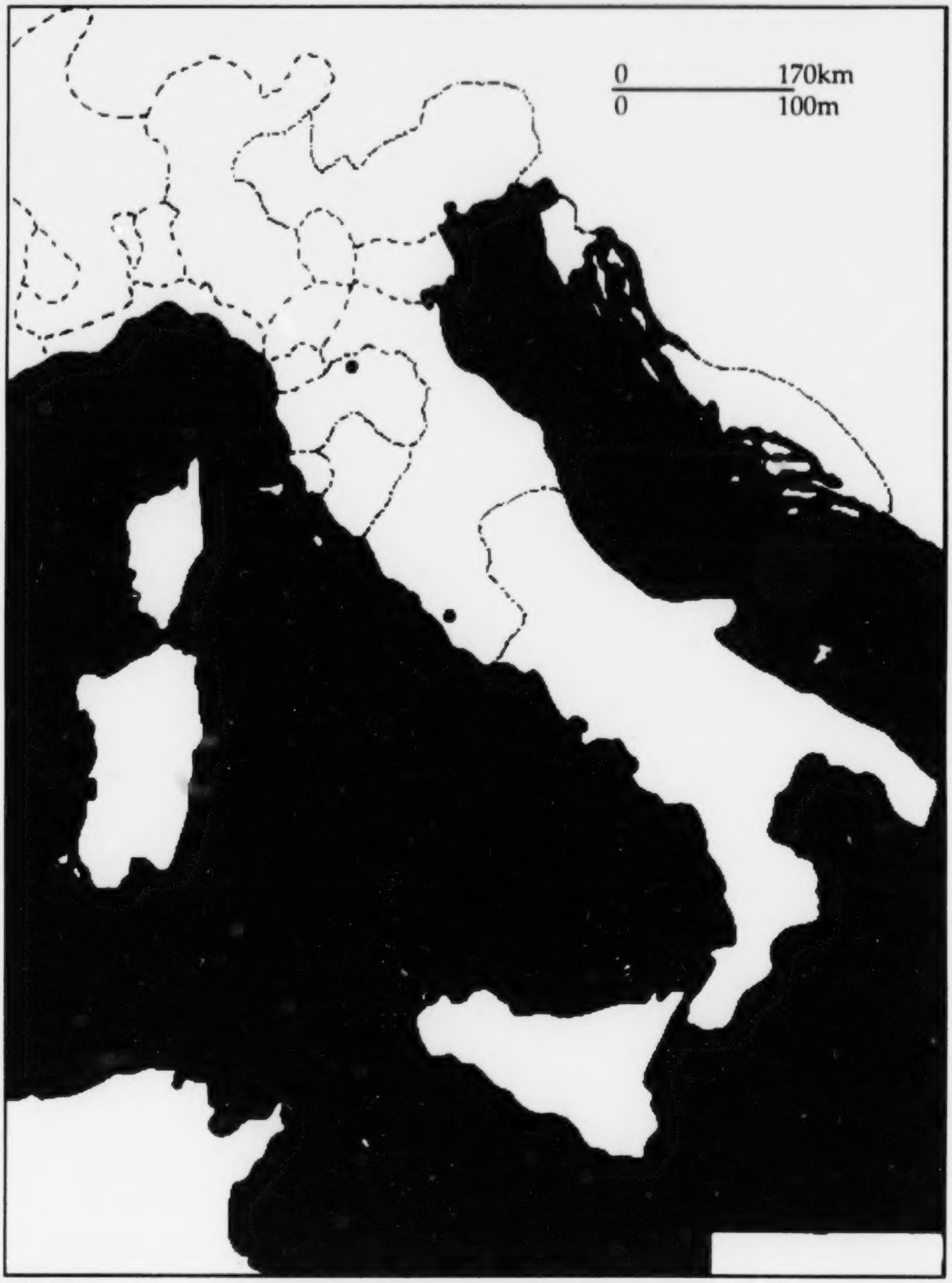
Map I
Illustrated by Carole Collier Frick

ITALY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Map II
Illustrated by Carole Collier Frick

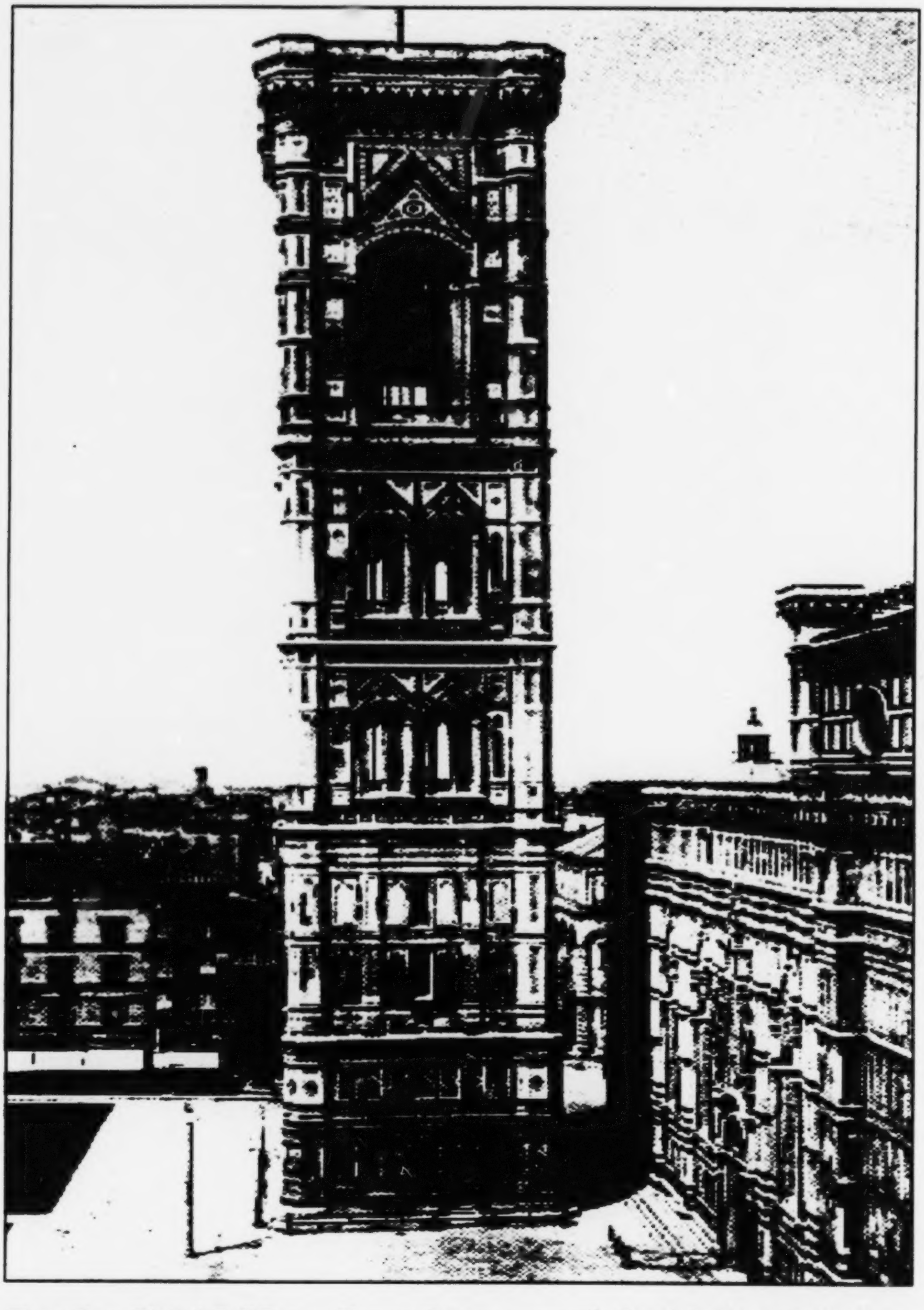

Figure One: Giotto's Bell Tower: Florence, Duomo, campanile, founded 1334. Fratelli Alinari, Art Resource, NY, NY.

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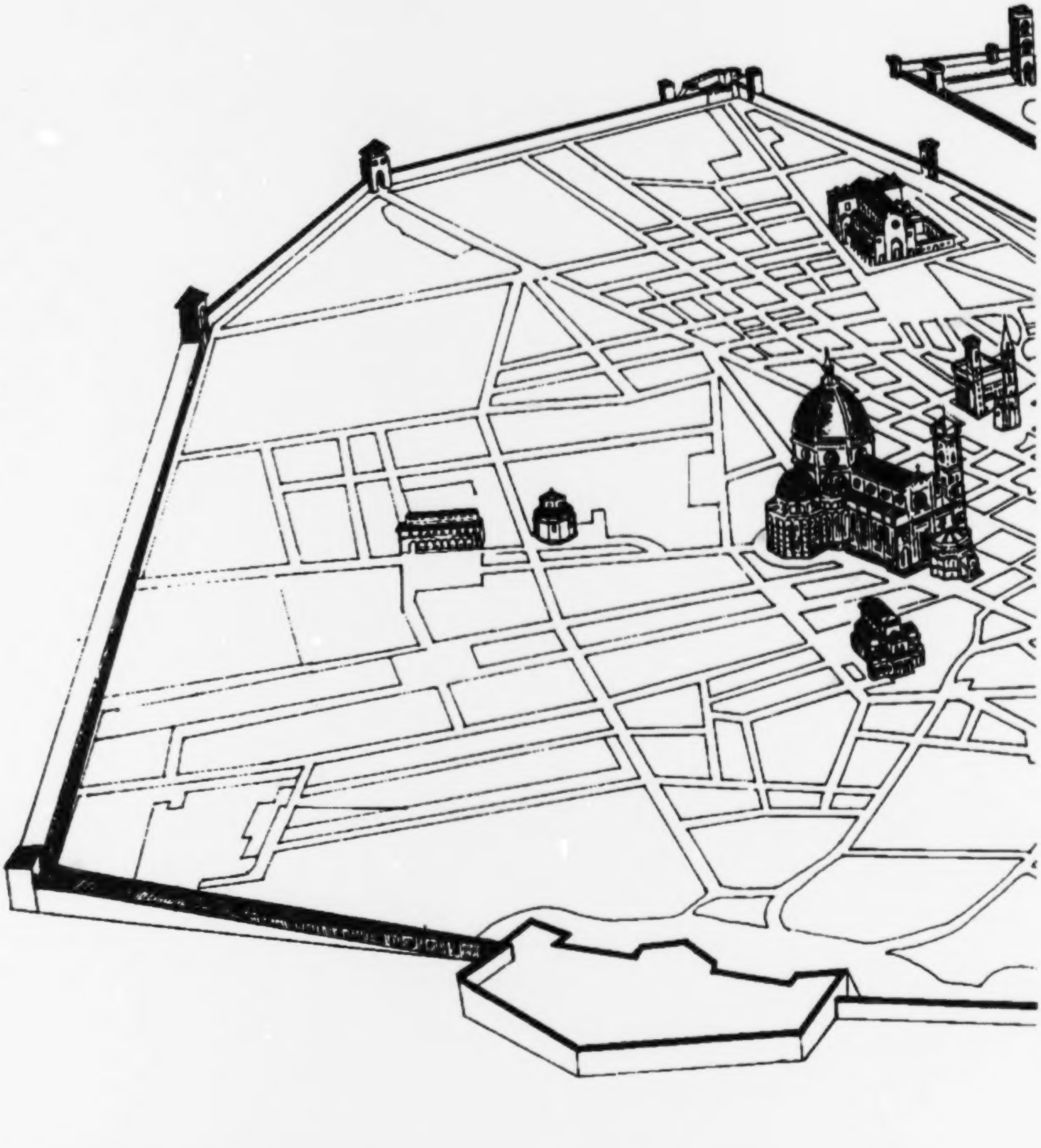
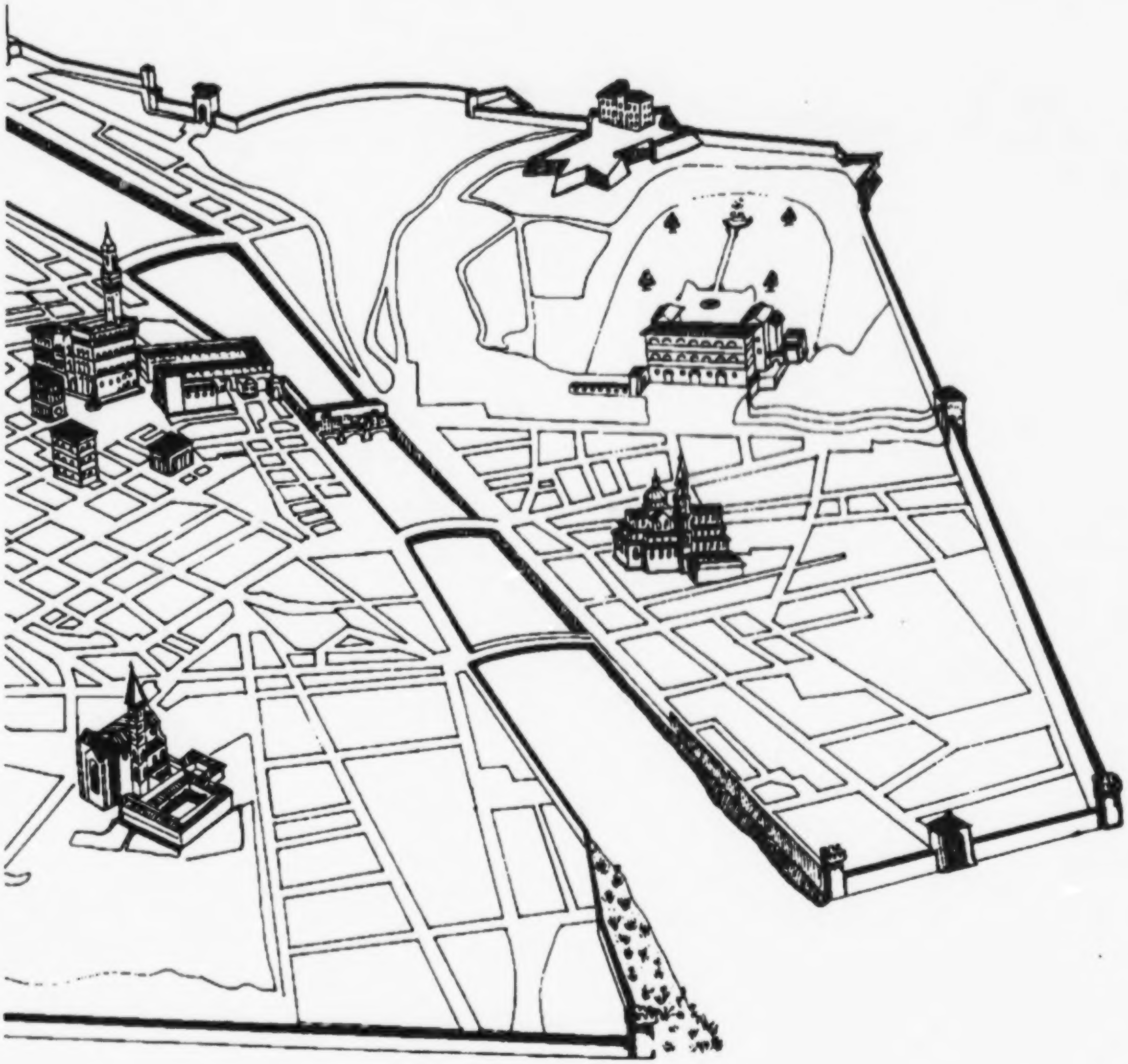
STREET PLAN OF FLORENCE



Part One, Map III
Illustrated by Carole Collier Frick

STREET PLAN OF FLORENCE



Part Two, Map III

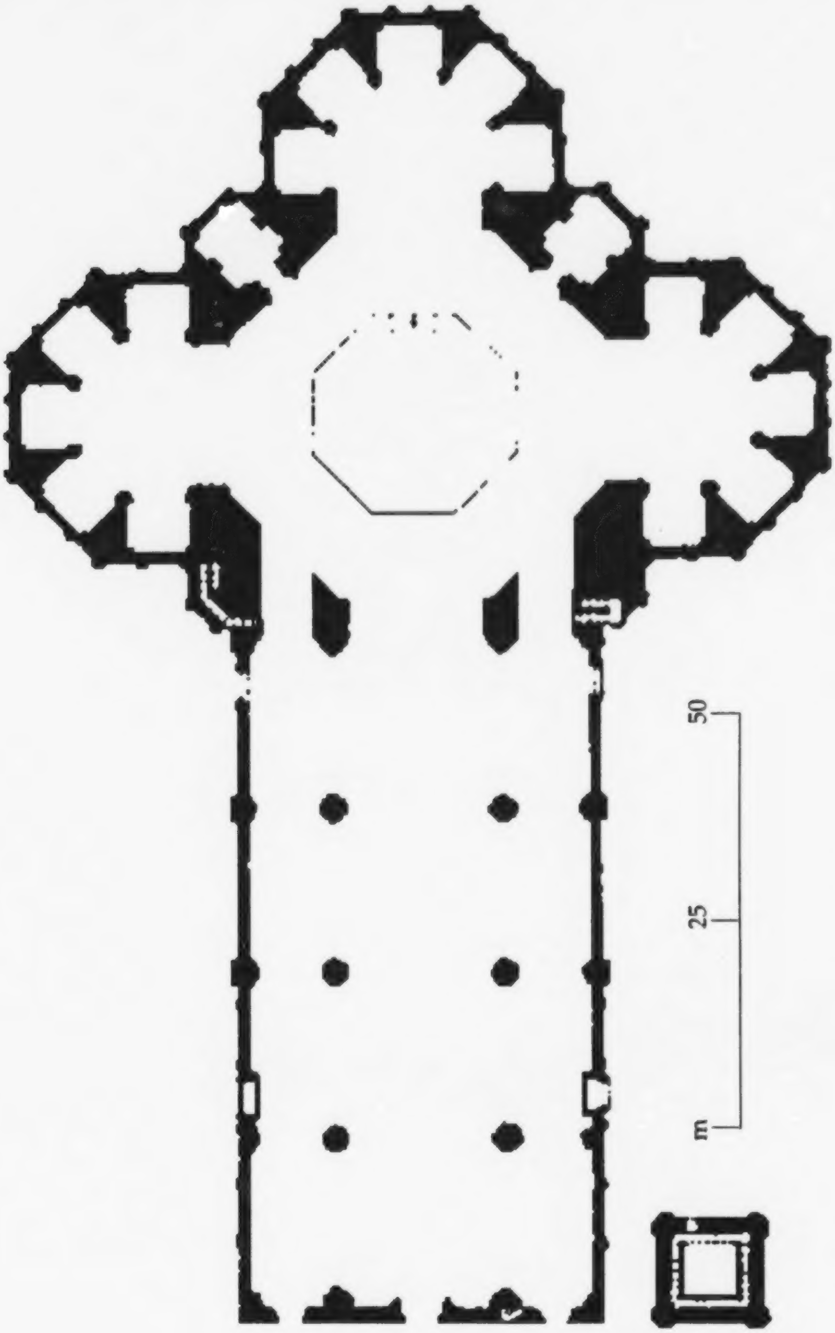


Figure Two: Plan of the Cathedral

This illustration was reproduced as published in Brunelleschi, by Giovanni Fanelli, copyright 1980, with the kind permission of the copyright owner, Philip Wilson Publishers, London.

LESSON TWO

THE CHALLENGE

A. Objectives

1. To understand the role of the guilds in governing Renaissance Florence.
2. To understand the profound influence of classical art on Renaissance artists and thinkers.
3. To appreciate the role of archaeology in the Renaissance discovery of the ancient past.
4. To learn about the competition to build the dome between Filippo Brunelleschi and Lorenzo Ghiberti.
5. To comprehend Brunelleschi's incredible single-minded drive towards the goal of building the dome.
6. To realize that hard work and study must accompany the kind of innovative and creative work which will make an impact on society.
7. To read and analyze a primary source biography written by an artist living more than 100 years after Brunelleschi.

B. Lesson Activities (One or Two Days)

1. Before reading the Student Background, explain to students that they will be reading a **primary source** throughout the unit. Explain to students that a primary source can be a first hand historical account, a historical account written somewhat later on, or even a photo or architectural rendering. Explain that historians use primary sources for their research and that students can use them as well. In this lesson, the

primary source we will use is a biography written by **Giorgio Vasari**, an Italian artist who was writing almost a century and a half after the events we are describing. Make it clear that his account is probably exaggerated in its laudatory descriptions of Brunelleschi but that this sort of subjectivity is something which historians must take into account with any document they look at.

2. Have students read **STUDENT BACKGROUND TWO**.

3. Hold a discussion on the background materials, making sure to refer to the "Sample Questions" in part "D" of these instructions (Also make sure to go over the pronunciation of difficult words.)

4. Have students locate Rome on their map of Italy and have them estimate the distance from Florence both in kilometers and in miles. (Use ***Map II***, **LESSON ONE.**)

5. Have students add the following dates to their time lines:

   a. Brunelleschi's birth date (1377).

   b. The year of the competition for the bronze doors for the baptistry and the year he went to Rome with Donatello (1401).

   c. The year he was given the commission for the dome (1420).

Sample Timeline

1290	Beginning of Cathedral
1348	Black Death
1377	Brunelleschi's Birth Date
1400	
1401	Door Competition with Lorenzo Ghiberti
1420	Received Commission
1482	Completion of Cathedral

6. In committees, have students prepare a position paper on one of the following topics:

   a. The competition between Filippo and Lorenzo. Do they view this sort of competition as positive or negative.

   b. The merits of his "challenge of standing an egg on its end." Does this reveal his superiority as an engineer and architect?

7. Define vocabulary terms in notebook.

C. **Extended Activities**

1. Students can make illustrations of the great Roman domes such as the **Pantheon** which is still standing today. (See *Figure Four,* **LESSON THREE**) They can also illustrate Roman arches, aqueducts, and columns. For this activity they can refer to art books

such as the **Étienne Dupèrac** engraving in this lesson. (See ***Figure Two***) Students can make simple pencil illustrations in their journals or they can make larger drawings or paintings for the classroom.

2. Students can do research on the guild system and governance of Florence.
3. Students can research the art, literature, philosophy or science of the Renaissance in order to discover the influence of Classical Rome.
4. Students may look up a short biographical description of the artist **Giorgio Vasari**.

D. Sample Questions to Facilitate Discussion

1. Describe the Greater and Lesser Guilds and explain how they functioned in Florentine society.
2. Why didn't the planners of great cathedrals stick to their original plans over the entire period of construction?
3. How does Vasari describe Brunelleschi's physical appearance? What connection does Vasari make between Brunelleschi's physical appearance and his abilities?
4. What career did Brunelleschi's father hope he would follow professionally?
5. What were Brunelleschi's interests as a child and young man?
6. Describe the competition between Ghiberti and Brunelleschi.

7. Why did Brunelleschi go to Rome and how did he occupy himself there?

8. What were Brunelleschi's two great ambitions in life? Do you think that a person needs to have a great personal plan to make a significant contribution in life?

9. Why did Brunelleschi go back to Rome a second time? What effect did this have on the cathedral committee?

10. Why do you believe that Brunelleschi was given the commission to build the dome?

E. Vocabulary

1. archaeologists
2. kilometers
3. Lorenzo Ghiberti
4. Donatello (dawn-ah-$\overline{\text{tell}}$-oh)
5. bias
6. subjectivity
7. primary source
8. Manetti (mah-$\overline{\text{net}}$-ee)
9. Vasari (vahs-$\overline{\text{ar}}$-ee)
10. Étienne Dupèrac
11. Seven Greater Guilds
12. Fourteen Lesser Guilds
13. Priors
14. vaulting
15. Pantheon ($\overline{\text{pahn}}$-thee-on)

F. Evaluating the Lesson

1. Informal evaluation of discussion.
2. Evaluation of map work and timelines.
3. Evaluate position papers presented by committees.
4. Check vocabulary terms in note.

THE CHALLENGE

Before we set the stage for the planning and building of the magnificent dome, we must understand the unique way in which Florence was governed and how decisions were made on behalf of the community. In medieval Florence trade and manufacturing were controlled by the **guilds**, which were associations of men who worked in similar trades or businesses. These guilds set up standards and rules for that particular trade or business, and in certain cases their members accumulated tremendous wealth and political power. There were **Seven Greater Guilds** and **Fourteen Lesser Guilds**.

The Greater Guilds represented the richest merchants and businessmen and consisted of the following: 1. Judges and notaries; 2. cloth importers and refinishers; 3. cloth manufacturers; 4. leading retailers and silk merchants; 5. money changers; 6. furriers; and 7. physicians and apothecaries. The fourteen Lesser Guilds were made up of smaller traders and craftsmen: 1. butchers; 2, shoemakers; 3. blacksmiths; 4. builders; 5. secondhand dealers; 6. wine-dealers; 7. innkeepers; 8. sellers of salt, oil and cheese; 9. tanners; 10. armorers; 11. ironworkers; 12. beltmakers; 13. woodworkers; and 14. bakers.

The city government was originally composed of six chief magistrates (or **Priors**) elected from the members of the guilds, each serving for a two month term. Other committees forming part of the city government were also elected for short terms from among the guilds. By the late fourteenth century only members of the Greater Guilds were eligible for office, and the Lesser Guilds played only a minor part in government. This was by no means a democracy in the true sense of the word, but it was an attempt to prevent any one tyrant from usurping power, by rotating authority among a fairly large group.

It was the government, supported by the guilds, which embarked upon a sustained effort to beautify the city from about 1290. During the middle ages fortification was the major building priority and streets grew up in unplanned disorder. By the thirteenth century the city leaders were tired of the centuries of unplanned growth and wanted to plan a city which would be orderly and elegant. The building of the cathedral of Florence was an attempt to do this[1]. Decisions about the cathedral and other public buildings were taken by the committees in charge (the Cathedral Works Commission), and by the guilds which had agreed to finance it. The original plans were modified on several occasions, and work proceeded with frequent interruptions. The plague of 1348 caused a long stoppage. Despite later economic difficulties and recurrences of the plague, work continued and the original design was made bigger and grander than before. The final design was agreed on in 1368 with an enlarged dome, even though the committees in charge did not know how such a vast dome could actually be built. But they were confident that the technical problems could be solved: civic wealth and human ingenuity would eventually find the way to do it. "No dome on such a scale had been attempted since Antiquity. ....When Brunelleschi solved the problem, half a century later, it was even then among the wonders of the age"[2].

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[1] White, Art & Architecture in Italy, pg. 159.

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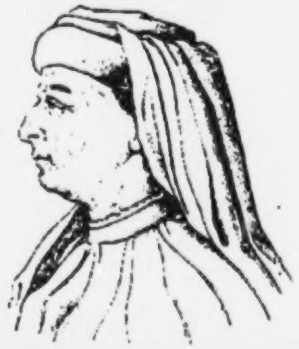
[2] White, Art & Architecture in Italy, pg. 323.

FILIPPO BRUNELLESCHI

There are two biographers whom historians rely upon to find out about the life of Filippo Brunelleschi. One, **Antonio Manetti**, was a Florentine architect who knew Brunelleschi in the last years of his life. He was able to talk to people who had known Brunelleschi earlier in his lifetime. The other, and more famous biographer, named **Giorgio Vasari**, was a painter who wrote in the mid sixteenth century, well over a century after Brunelleschi's death. He relied heavily upon Manetti's biography for the details of Brunelleschi's career. He is more famous than Manetti because he wrote eight volumes on all of the famous Renaissance artists called The Lives of the Painters, Sculptors & Architects. Both biographers were awestruck by Brunelleschi's genius and perhaps at times they make him look even greater than he was. We will be relying on Vasari's biography to tell Brunelleschi's story. The following is Vasari's opening description of Brunelleschi:

> ***Many whom Nature creates small and insignificant in appearance have their souls filled with such greatness and their hearts with such boundless courage that even if they undertake things of almost impossible difficulty, they bring them to completion to the wonder of all beholders.***



Vasari goes on to describe Brunelleschi's early childhood learning and the successful beginnings of his career as an artist/architect/engineer/sculptor. Note that Brunelleschi was educated in all subjects, including the liberal arts and mathematics, before he became a goldsmith's apprentice. This well-rounded education was very important to the development of his unique talents and abilities and made it possible for him combine creative thinking with great engineering skills.

> *In the child's early youth his father carefully taught him the first principles of letters, in which he exhibited much intelligence, but he did not wish to attain to great perfection in this, intending apparently to devote himself to more practical things. This greatly displeased his father, who wished to make him a notary. But perceiving that the boy was always returning to art and manual work, he made him learn the abacus and writing, and then apprenticed him to a goldsmith, a friend of his, so that he should learn to design. Greatly delighted, Filippo began to learn and practice that art, so that before many years he could set gems better than a practiced craftsman. Coming into contact with some studious artists, he began to study motion, weights, and wheels and so produced with his own hand some very beautiful clocks. Not content with this, he aspired to practice sculpture, and this led to a friendship between him and Donatello, the young sculptor of skill and great promise, so close that they did not seem able to live apart from one another. Filippo was also considered an excellent architect by persons qualified to judge.*

Brunelleschi first attracted attention in 1401, when the city of Florence staged a great competition to choose a sculptor for a set of bronze doors for the old baptistry of San Giovanni, (i.e. St. John the Baptist), close by the cathedral. (See *Figure One*) These doors would be among the crowning achievements of the era. Vasari describes the competition below.

> *In the year 1401, it was proposed to make the two bronze doors of the church and baptistry of San Giovanni, sculpture having advanced so greatly. Accordingly the purpose was made known to the sculptors then in the region of Florence, who were sent for, and set to prepare a panel. Among those invited were Filippo, Donatello, Lorenzo Ghiberti,* (and others). *The panels were completed that same year, and when they came to be exhibited*

STUDENT RESOURCE: STUDENT BACKGROUND TWO

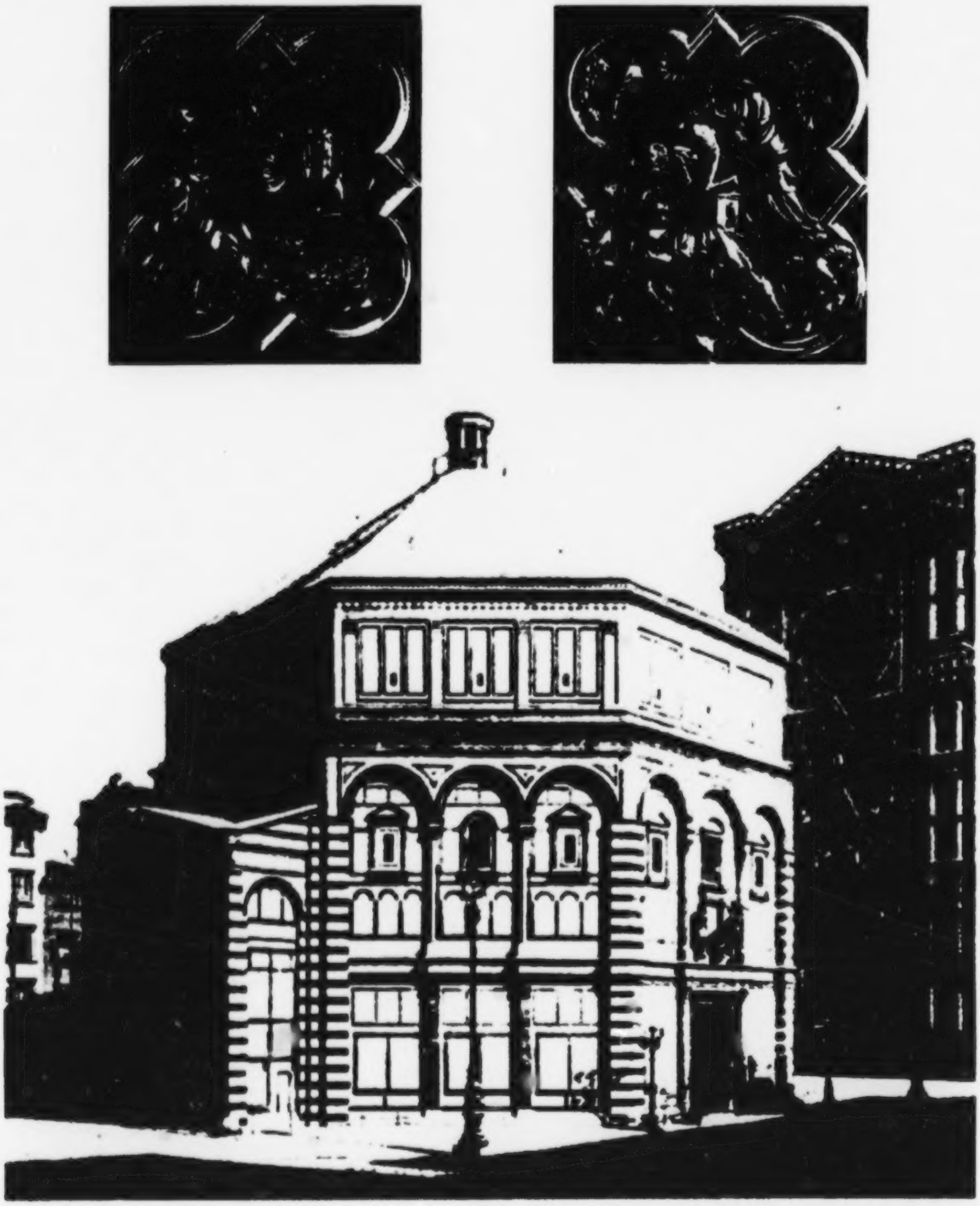


Figure One: (Top) First set of doors for the baptistry. Brunelleschi did a second set in the 1430's for the other entrance to the baptistry. The second set of doors is the set which Michelangelo called the "Gates to Heaven." Battistero del Duomo e Museo Opera, Italia, Sculpture in Italy. © 1966 by Charles Seymour Jr. (Bottom) Florence Baptistry. Fratelli Alinari, Art Resource, NY, NY.

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> *in competition, they were all most beautiful, each different from the other. The best was that of Lorenzo Ghiberti, the figures being beautifully made. Not much inferior to his, however, was the panel of Filippo, on which he had represented Abraham sacrificing Isaac. When the scenes came to be exhibited, Filippo and Donatello judged that Lorenzo's work was better adapted to its purpose than those of the others. So they said that the commission for the new doors should be given to Lorenzo. Filippo was requested to undertake the work together with Lorenzo, but he refused, as he preferred to be the first in another art, rather than be equal or second in this one.*
>
> *After the doors had been allotted to Ghiberti, Filippo and Donatello determined to leave Florence and go to Rome for a while, the one to study architecture, and the other sculpture. At the sight of the grandeur of the buildings, and the perfection of the churches, Brunelleschi was lost in wonder, so that he looked like a demented person. He set to work to draw the plans of these buildings measuring everything of excellence.* **[See Figure Two.]** *Being free from the cares of a family, he abandoned himself to his studies, neglecting to sleep and to eat, his only concern being architecture, studying the good ancient ways of building.*

Read the following passage in Vasari carefully, because it reveals Brunelleschi's two great ambitions in life. Don't forget it is only 1401 and Brunelleschi as a very young man is already planning great achievements for the distant future.

> *Two great ideals possessed him—one was to bring to light good architecture, of which he should be the creator and discoverer; the other was to find a method, if possible, for vaulting the dome of Santa Maria del Fiore, the difficulty of which had made every one avoid it. However, he did not yet disclose his ambition to Donatello or to any living soul. In Rome he attentively observed all the technicalities in the vaulting of the Pantheon. (See Figure Four, Lesson Three). He noted and drew the other antique vaults and he was continually studying the subject. If pieces of columns and bases of buildings were found buried he and Donatello set to work and dug them out to find the foundations. He drew every sort of building, round and square, and octagonal churches, baths, arches, coliseums, amphitheaters, and every temple of brick, noting the methods of binding and clamping, as well as the turning of the vaulting.*

BASILICA OF CONSTANTINE, ROME

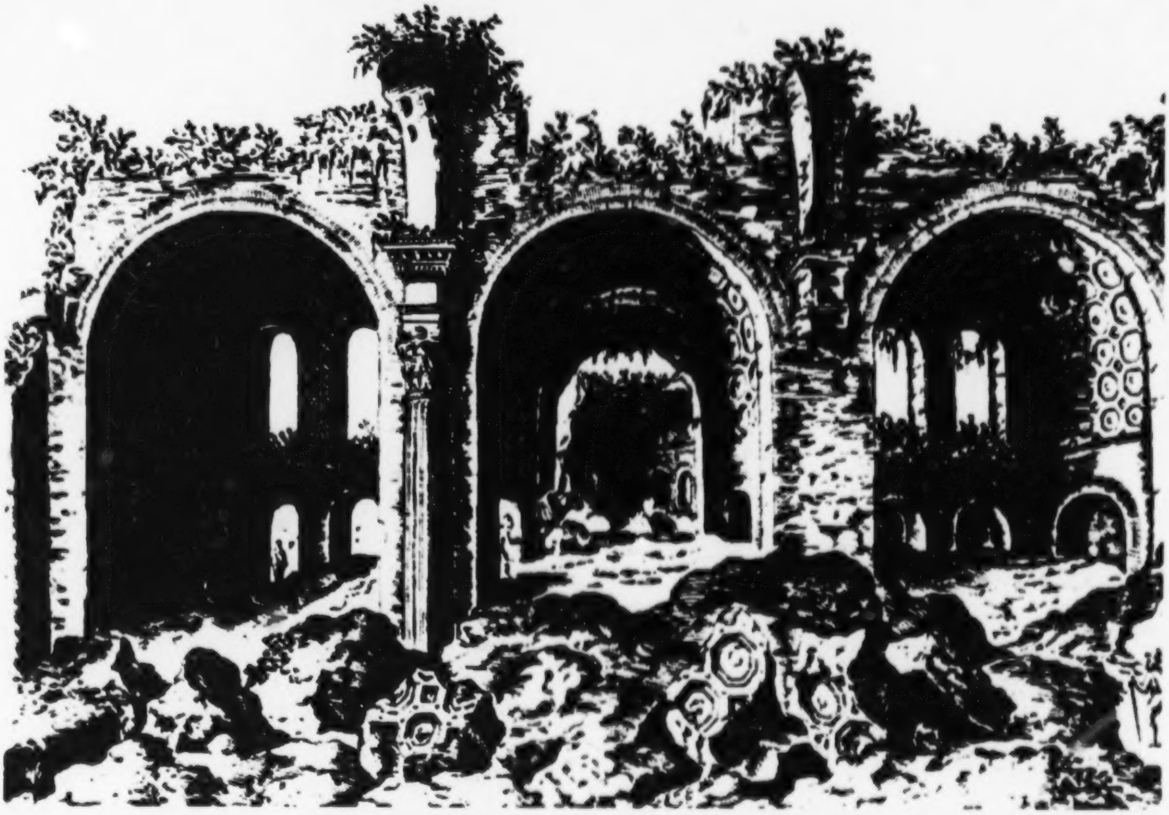

Figure Two: Étienne Dupérac, Rome, Basilica of Constantine, (Temple of Peace), engraving. Photograph courtesy of Electa, Milano.

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As you can see, Brunelleschi and Donatello became archaeologists, digging up the past in order to learn about it.

In about 1407 Brunelleschi came back to Florence from Rome. The Florentine wool guild, which had agreed to pay for the new dome, was holding a competition for proposals to construct it. Brunelleschi offered a plan as did many other architects, but none of the proposals was accepted, because none seemed capable of solving the problem of how to cover such a wide space.

Some years later (Vasari does not tell us clearly when but it must have been about 1418), the Florentine authorities held another competition. Brunelleschi had by now worked out how to build the dome, and had secretly built a wooden model to show how it could be done. Discussion went on for a long time. Various proposals from different architects were examined, and rejected. Brunelleschi was then asked to show his model and plan, which the committee had previously considered too far-fetched. He refused to show his model, and instead made a rather strange offer. Read Vasari for his description of an incident which is probably fictitious (but which is still a good story):

> ***Filippo proposed to the architects that whoever should make an egg stand upright on a flat marble surface should build the dome, as this would be a test of their ability. He produced an egg and all the architects tried to make it stand but no one succeeded. Then they passed it to Filippo, who lightly took it, broke the end with a blow on the marble and made it stand. And so it was resolved that he should be put in charge of the work, and he wrote on a sheet of paper a brief outline of his plan.***

Excerpts were taken from The Lives of the Painters Sculptors and Architects by Giorgio Vasari in Eight Volumes, Vol. Two Filippo Brunelleschi, Sculptor and Architect of Florence, Translated by A. B. Hind MDCCCC.

Brunelleschi was given the commission in 1420 but many people felt that the work was of such great importance and technical difficulty that it could not be entrusted to a single person. Since Lorenzo Ghiberti had proven his genius in his sculpting of the baptistry bronze doors, and since he had great influence with the people in power, he was chosen to work with Filippo. Filippo was furious and bitter, especially since Ghiberti was being paid three times as much as he was for a job which Filippo knew only he could really do.

THE BUILDING OF THE DOME

A. Objectives

1. To appreciate Brunelleschi's innovative contributions to the development of architecture.

2. To realize that, before Brunelleschi's time, cathedrals had always been built by groups of masons with a head mason in charge of the design. Brunelleschi altered this concept when he became the sole planner and inventor; while the others merely carried out what he designed. In other words, designing and building had become separate professions.

3. To understand the architectural principle of a double dome.

4. To appreciate how much Brunelleschi employed "hands-on" supervision of the construction.

B. Lesson Activities (One or Two Days)

1. Have students read **STUDENT BACKGROUND THREE** which includes the Vasari passages.

2. Hold a discussion using the "Sample Questions" in part D of these instructions.

3. Have students add the dates 1436, 1446, and 1482 to their time lines. (The year the lantern was designed, the year of Brunelleschi's death, and the year the lantern was completed.)

Sample Timeline

1290	Beginning of Cathedral
1348	Black Death
1377	Brunelleschi's Birth Date
1400	
1401	Door Competition with Lorenzo Ghiberti
1420	Received Commission
1436	Lantern Designed
1446	Brunelleschi's Death
1482	Completion of Cathedral

4. Fill out the **WORKSHEET I** on the Vasari passages.

5. Hold a class discussion on the students' findings on **WORKSHEET I**.

6. Define vocabulary terms in notebook.

C. **Extended Activities**

1. Have students draw an illustration of the double-dome construction. (See *Figure One*)

2. Have students look up the differences in engineering techniques between the single dome of the Roman Pantheon and Brunelleschi's double dome. Have them study a later dome (e.g. Michelangelo's St. Peter's, *Figure Three*, **LESSON FOUR**) which is also double, thus showing how Brunelleschi changed the

way domes would be built for all time.

3. Have students look up in newspapers and magazines how commissions of great architectural contracts have been awarded in the later twentieth century.

   For example:

   a. The East Wing of the National Gallery in Washington, D.C.

   b. The Pyramid at the Louvre in Paris.

   c. The new wing of the National Gallery in London.

   d. The building of the Japanese Gallery at the Los Angeles County Art Museum.

4. Students can look up the most significant commissions of their own city and see how these were awarded. (Answer for teacher: in a competition, much as commissions were awarded during the Renaissance.)

D. Sample Questions To Facilitate Discussion

1. What were some of the chief engineering problems which needed to be solved?

2. Why didn't Brunelleschi want to share the building of the dome with Lorenzo Ghiberti?

3. Why was Ghiberti paid more for his model and how did Brunelleschi feel about it?

4. How did Brunelleschi prove that Ghiberti was not fit

for the job?

5. How did the role of the medieval and Renaissance architect differ from the role of a modern architect?

6. Describe Brunelleschi's supervisory activities.

7 What happened to Brunelleschi's model for the lantern?

E. Vocabulary

1. engineering
2. aesthetic
3. pleurisy
4. double dome
5. Pantheon
6. scaffolding
7. *braccia* (bra-cha)
8. chain (in the case of the dome)
9. herringbone brickwork

F. Evaluating the Lesson

1. Informal evaluation of discussion.

2. Evaluate accuracy of time lines.

3. Evaluate Document Analysis Worksheets as well as brainstorming session about worksheets.

4. Check definitions in notebooks.

THE BUILDING OF THE DOME

Building of the dome began in 1420. As you will see, the supervision passed into Brunelleschi's hands in 1426. In 1436, after sixteen years of labor, the dome was finally finished except for the lantern on top. Brunelleschi had solved engineering problems for which no known solutions existed.

The chief engineering problem was the tremendous weight of a dome as large as this. (The dimensions of the dome are 130 ft. in diameter and 185 ft. in height.) Brunelleschi developed many ingenious solutions with his creation of a **double shelled dome**. To reduce the weight of the brickwork, he borrowed the **herringbone** technique of **bricklaying** which he had studied in Roman buildings. He created stone ribs which would strengthen and connect the shells. Brunelleschi also had to design all of the scaffolding and the hoists to lift materials up into the great open space. (See ***Figures One*** and *Two*.)

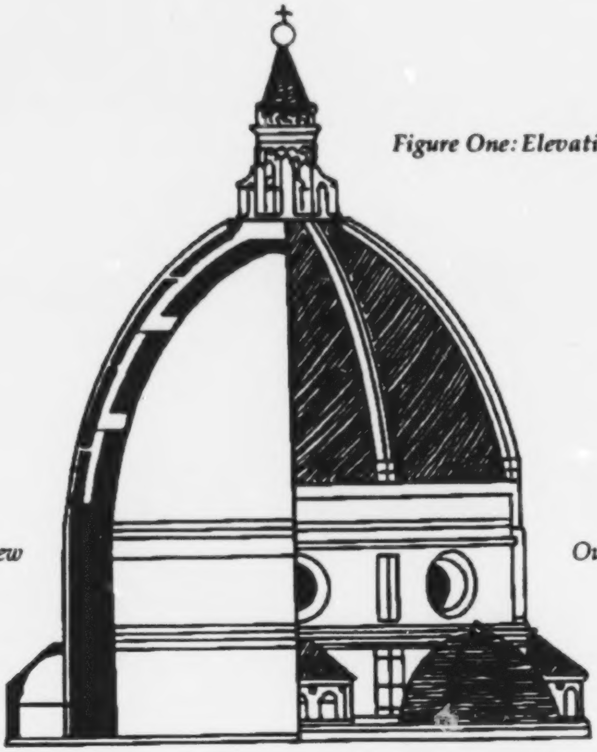


Figure One: Elevation of Double-Dome

Illustrated by Carole Collier Frick

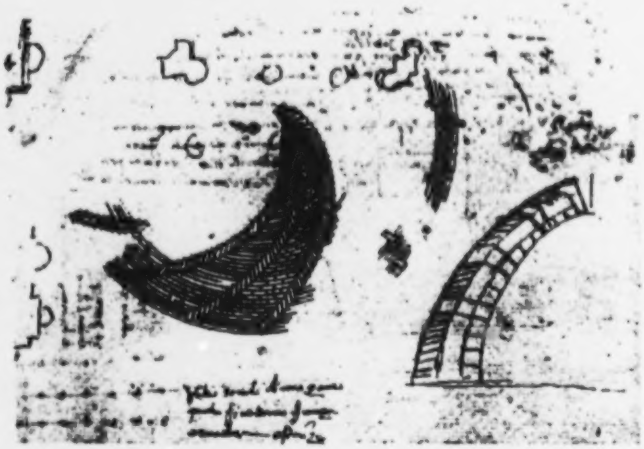


Figure Two: Plan of herringbone masonry. Reproduced as published in Brunelleschi, by Giovanni Fanelli, copyright 1980, with the kind permission of Philip Wilson Publishers.

After working so many years preparing for building the dome, you can well imagine that Brunelleschi did not want to share the glory with his old rival, Lorenzo Ghiberti. As you remember, Filippo wouldn't share the commission for building the great bronze doors and went off to Rome in a huff rather than work with him. Now their roles were reversed; Brunelleschi had won the competition, but Ghiberti had refused to back out as Brunelleschi had done on the previous occasion. Vasari describes the situation like this:

> *Filippo pursued his work with no good will, for he knew that all of the labor would devolve upon him while he would have to share the honor and renown with Lorenzo. It then occurred to Filippo that he would make a model, with all the difficult details to scale, such as the lighted and dark staircases, all the lights, doors, chains, and also a part of the gallery. When Lorenzo heard of this he tried to see it, but since Filippo refused he became angry and determined to make a model of his own, in order that he might not appear to be drawing his salary for doing nothing. For his model Filippo received 50 lire while Lorenzo Ghiberti was paid 300 lire, the reason for the difference being his greater influence and favor.*

This greatly irritated Filippo, but the committee went ahead and confirmed Lorenzo as joint director of the work on the dome with him. Filippo disliked this arrangement and finally in 1426 he devised a plan to rid himself of Lorenzo once and for all. Work on the dome had now reached a critical point and Filippo knew that Lorenzo lacked the technical skill to direct operations on his own. Vasari describes his plan of action:

> *One morning Filippo did not appear at the work, bandaged his head, and took to his bed pretending that he had pleurisy. When the workmen who were waiting for orders heard this they went to Lorenzo and asked what*

> *they were to do. He answered that Filippo was in charge, and that they must wait for him. One of them asked, "But do you know his intentions?" "Yes," said Lorenzo, "but I will do nothing without him." After Filippo's illness had lasted for more than two days, the master builders went to see him and insisted that he should tell them what was to be done. He answered: "You have Lorenzo, let him do something," and nothing more could be drawn from him. Meanwhile the building came to a standstill, and the builders and stonecutters began to murmur against Lorenzo, saying, "He can draw his salary all right, but cannot give directions for the work." The city authorities went to see Brunelleschi and informed him of the trouble his sickness had caused. With words made passionate by his pretended illness and by his love for the work Filippo replied, "Is not Lorenzo there? Why does he not do something? I wonder at you coming to me." "He will do nothing without you," answered the committee members. "I could manage very well without him," was Filippo's retort.*

Filippo then returned to work and proposed the following idea to the authorities:

> *....it has occurred to me that as you, sirs, have divided the salary, so we may divide the work in order that each of us may show his knowledge, and be in a position to win honor and profit from the republic. We have at present two problems to solve: one is the scaffolding to permit the builders on the outside and inside of the structure to work in safety,* (See *Figure Three*) *This scaffolding must be strong enough to bear the weight of the men, stones, and mortar, as well as the crane for lifting weights, and other machines like it. The other problem is how to construct the chain which is to be placed around the dome at a height of 12 braccia from its base (braccia= roughly one foot) to bind together the eight sides of the dome so that the weight above will be distributed evenly over the part of the building below and will not spread and crack the base of the dome. Let Lorenzo take whichever of these two jobs he believes himself most capable of doing, so that I may prove my ability to carry out the other, and that no more time should be lost.*

Lorenzo chose to construct the chain, thinking it the easier of the two tasks. Filippo made a model for the scaffolding which was successful and proved his great ingenuity, but it was soon clear that Lorenzo's model for the chain would never work. Filippo then produced his own models for the chains which he had already made, and it became obvious to every one that Filippo's design would work and that they had been wrong for years in favoring Lorenzo. Filippo was then made sole director and head of the work for life and given a large increase in salary. Lorenzo continued to draw his salary for three more years, but he had been thoroughly disgraced and had little to do with the project.

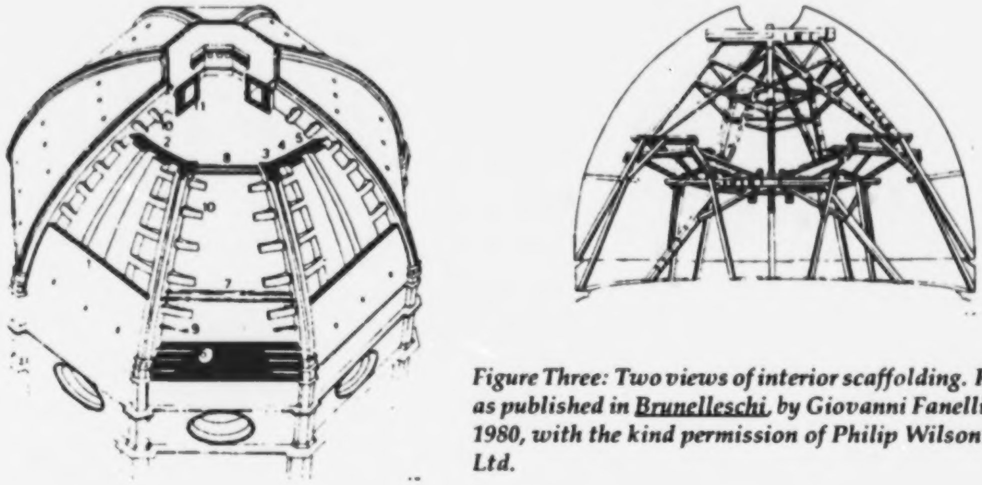


Figure Three: Two views of interior scaffolding. Reproduced as published in Brunelleschi, by Giovanni Fanelli, copyright 1980, with the kind permission of Philip Wilson Publishers Ltd.

Brunelleschi returned to the site having finally achieved sole directorship of the project. This was a new departure in the building of cathedrals and great public buildings. Before this no single architect was responsible for a building of this scale and magnificence. The term "architect" as we know it today, the designer and creator of a building, was in this way defined by Brunelleschi. The function of the designer was separated from the actual work of the building.

However, Brunelleschi's role was less specialized than that of a modern architect. A modern architect draws the plans for a building in collaboration with other specialists like structural engineers; the plans then guide the work of the contractors who do the actual construction. Brunelleschi however was architect, structural engineer, scaffolding expert, and many other things at the same time. He combined all the functions that are now divided among a team of specialists. Vasari describes Brunelleschi's dedication to the project like this.

> ***Filippo followed the work's progress so closely that not a stone was laid without his personal supervision. Filippo was continually making designs for the smallest details, constructing models for scaffolds, and designing***

> *machines for raising weights. He devised a method of raising weights by means of pulleys, so that a single ox could lift as much as six pair of oxen would otherwise have had difficulty in doing. The dome had by this time risen so much and the workmen spent a great deal of time climbing up and down the scaffolding. Filippo therefore contrived that inns should be opened on the dome, where food could be cooked and wine sold. In this way no one left the work except at the evening, which was a great advantage to the men and saved a lot of time, speeding up the work. He carefully examined the stones to see that they were hard enough or if they contained any flaws, and showed the masons how to join the blocks of stone by models made of wood and wax, or even of turnips. He did the same thing for the smiths with the ironwork.*

These excerpts were taken from The Lives of the Painters Sculptors and Architects by Giorgio Vasari in Eight Volumes, Vol. Two Filippo Brunelleschi, Sculptor and Architect of Florence, Translated by A. B. Hind MDCCCC.

Brunelleschi lived long enough to complete the construction of his dome, which would become as influential for the future development of architecture as the Pantheon of Rome built about 1400 years earlier (See *Figure Four*).

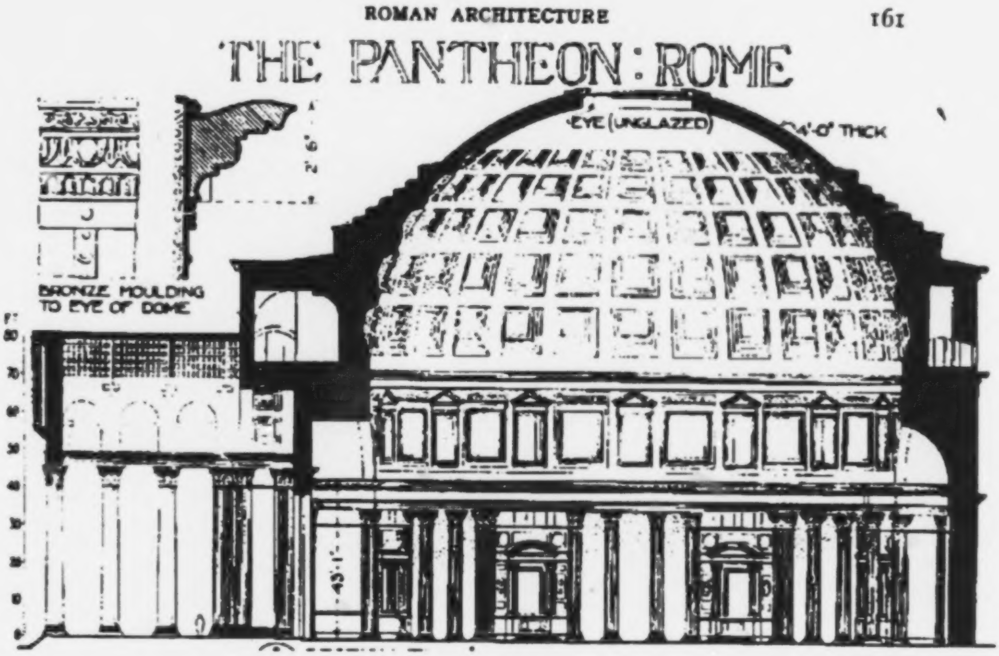


Figure Four: Drawing of Pantheon from A History of Architecture on the Comparative Method, by Sir Banister Fletcher, copyright 1896, B.T. Batsford, Ltd.: London

In 1436, when the dome was finished, he designed a model for the lantern which would sit on top of it. (See *Figure Five*). However, he did not live to see the lantern's completion because he died in 1446, thirty six years before it was finished. In the next lesson we will see how the lantern was completed.

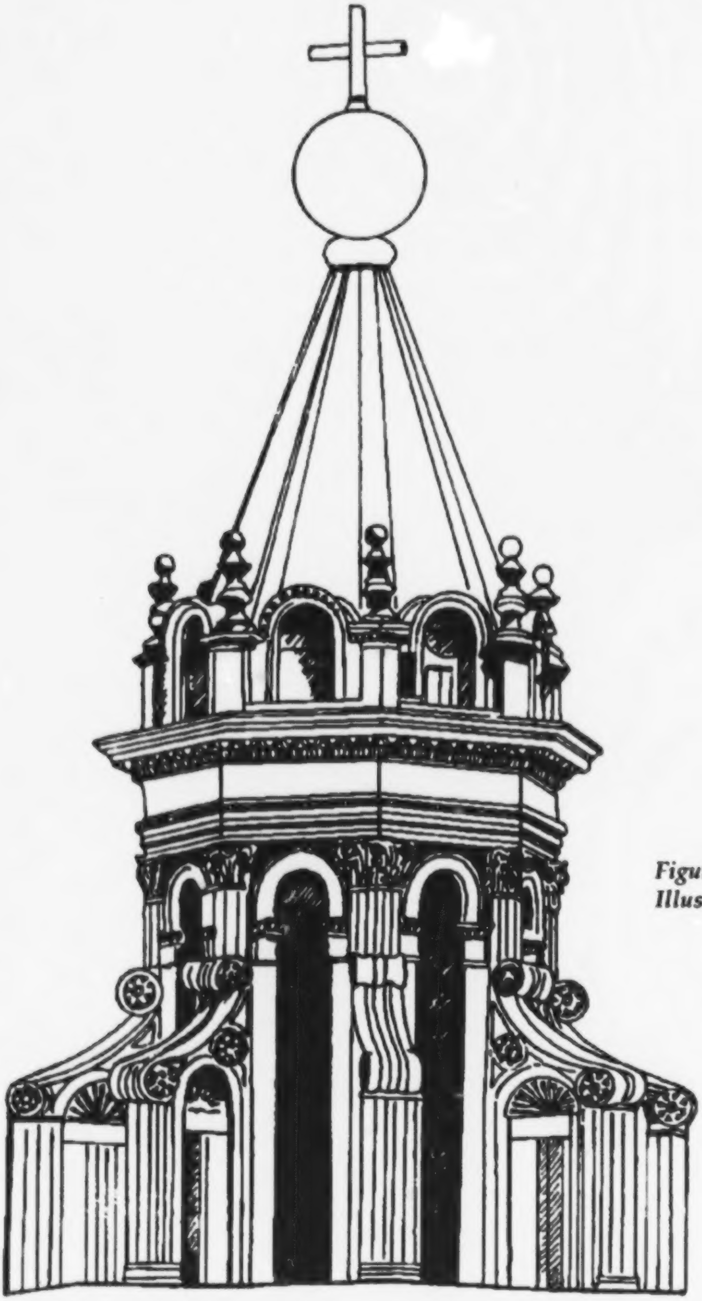


Figure Five: Lantern
Illustrated by Carole Collier Frick

It is important to realize that while the dome of Santa Maria del Fiore was the most monumental of his architectural achievements, Brunelleschi designed and built many other buildings. All of his architecture borrowed from Roman techniques and style, and many of his buildings were as innovative as the dome. One of them was built just a few blocks from the dome, at approximately the same time. This was an orphanage and children's hospital facing onto a square. Along the front of the building is an elegant arcade based on classical designs, and carefully proportioned according to simple geometric forms (the square and the hemisphere). This simple but exquisite reinterpretation of classical architecture set the pattern for buildings all through the Renaissance. Brunelleschi's dome and the orphanage make a revolutionary break with the past, they are the first buildings in the Renaissance style. (See *Figure Seven*.)

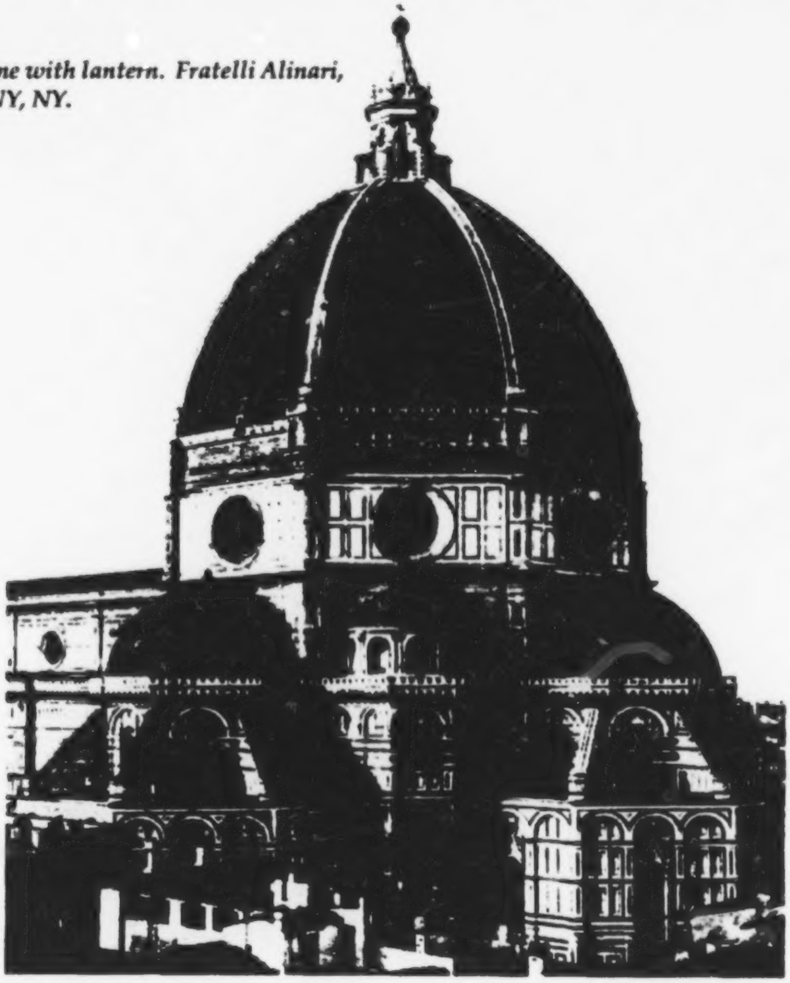
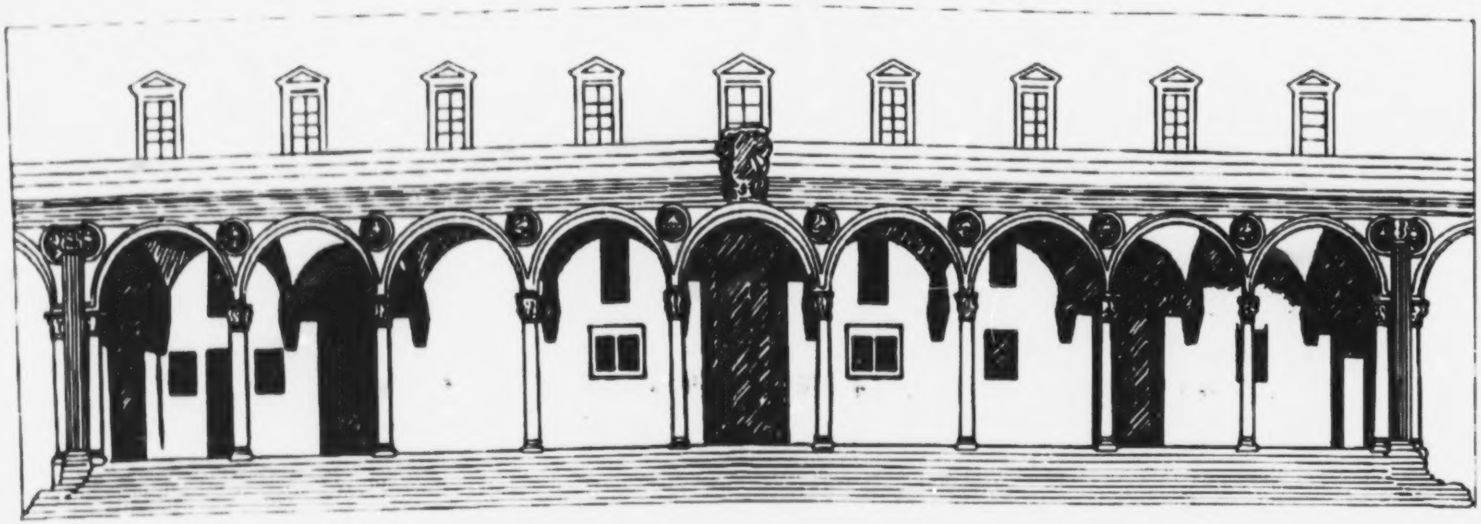


Figure Six: Dome with lantern. Fratelli Alinari, Art Resource, NY, NY.

ORPHANAGE AND CHILDREN'S HOSPITAL



Illustrated By Carole Collier Frick

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STUDENT RESOURCE: WORKSHEET I

Name ____________________

Period ____________________

DOCUMENT ANALYSIS WORKSHEET

We have used one primary source document in this unit, the biography written by Giorgio Vasari. It is essential when using documents of any sort to evaluate the information provided in order to determine its reliability. Please answer the following questions in order to evaluate the Vasari biography.

1. What type of document is it? (A letter, diary, newspaper, court proceeding, government record, historical biography.)

2. Can the author be identified? Do you know anything about the author which can be helpful?

3. Did the author take part in the event or was he/she reporting what others had said?

4. Did the author have a positive or negative interest in the events? How can you tell?

5. Can you imagine another document with a different point of view?

This worksheet was adapted from the Indiana Historical Bureau 1989 publication entitled "Pointers: How to Use Documents in Historical Research" as published in the Magazine of History, Vol. V., No. 1, Summer 1990.

LESSON FOUR

THE LASTING IMAGE OF THE DOME

A. Objectives

1. To appreciate how the dome has defined the city and skyline of Florence down to the present day.

2. To recognize the dome's influence on great religious buildings thereafter.

3. To identify the dome's influence on public buildings in America.

4. To appreciate the influence of landmark architectural developments on later monuments.

B. Lesson Activities (One Day)

1. Have students read **STUDENT BACKGROUND FOUR**.

2. Hold a discussion using Sample Questions.

3. Analyze the two views of the city which were drawn in the late sixteenth century and the eighteenth century. Note the significance of the dome in the landscape. (Use *Figures One* and *Two*)

4. Analyze illustrations of St. Peter's Cathedral and the Capitol Building in Washington, D.C. (See *Figures Three* and *Four*).

5. Conclude unit by brainstorming the importance of architecture in history and the importance of one man's vision.

C. Extended Activities

1. Have students write a report on the construction of the Capitol Building in Washington, D.C.
2. Have students look up important civic buildings in their town or city to see if they employ domed architecture.
3. Have students illustrate one such building.
4. Have them research how the commission was awarded and the history of the building's construction. How long did it take? How much did it cost? Was it controversial? How many architects were involved?

D. Sample Questions To Facilitate Discussion

1. Why were people worried about the weight of the lantern?
2. In what way did the dome change the skyline of Florence and its surrounding countryside?
3. How did the dome influence cathedral architecture?
4. Where do we see domes in American architecture?
5. Why do you think we in America venerate civic buildings in the way Renaissance Europe venerated religious buildings?
6. How does the American Capitol building relate to Brunelleschi's dome?
7. Why do you think the Capitol building and its dome

were so important to Abraham Lincoln?

E. Vocabulary

1. lantern
2. structural
3. decorative
4. cityscape
5. skyline
6. Alberti (ahl-$\overline{\text{bare}}$-tee)
7. encompass
8. landmark
9. St. Peter's Cathedral
10. The Capitol Building
11. public and civic buildings
12. treatise

F. Evaluating the Lesson

1. Check students' finished time lines.

2. Informal evaluation of discussion and brainstorming.

THE LASTING IMAGE OF THE DOME

The dome was complete as far as the base of the lantern in 1436 but the lantern was not completed until 1482, which is the date usually given for the completion of the cathedral. People were worried that a lantern of such great size would bring the dome tumbling down. The lantern is not just decorative, it serves the structural function of tying together the ribs of the dome at their point of junction. A certain weight was needed to hold the dome together and anchor it, yet too much weight would make it collapse. The city officials had such faith in Brunelleschi that they built the lantern as he designed it in spite of their fears. Brunelleschi had designed many cunning engineering techniques to achieve the structural results he wanted, such as hollowing out blocks of marble to reduce their weight. At the same time, his lantern created a new form of decorative architecture, complementing the dome which would be copied everywhere.

After the dome was completed in 1436, work on the lantern did not start for some time. Money was short and political troubles delayed completion of Brunelleschi's design, but just before he died in 1446 the foundations for the lantern were laid. The stonework was completed in the 1460's, but the last crowning touch was not added until 1482: in that year a great sphere of gilded copper was hoisted to the summit of the lantern. Vasari describes the scene:

> ***Upon the completion of the dome of Santa Maria del Fiore it was determined after much discussion to place a copper ball on the top of it, as Filippo Brunelleschi had devised. The job was entrusted to Andrea Verrocchio, who made one four braccia high, placed on a staff and so arranged that it could safely carry the cross. This done, it was installed amid universal rejoicing. It was necessary to employ both genius and diligence in its construction, because it was essential to arrange an entrance into it and to fortify it so that the wind should do it no harm.***

From Vasari's Life of Andrea Verrocchio

Brunelleschi's dome was finally complete. The citizens celebrated the completion of their cathedral, knowing that no other churches in Italy, or Europe, could rival the scale and magnificence of the dome that crowned it.

But Brunelleschi's dome and the lantern that crowns it are much more than a symbol of the power of the Woolen Guild of Florence or even a symbol of religious faith. The dome completely reorganizes the entire cityscape of Florence and its surrounding territories. The artist Leon Battista Alberti in his **treatise** "Della Pittura" describes the dome in this way: *"rising above the skies, ample enough to encompass in its shadow all of the people of Tuscany."*

Look at ***Figures One*** and ***Two*** and you can see how the dome now dominates the entire city like a huge hot air balloon hovering in the sky. By looking at the dates of these engravings you can see how the dome has remained a landmark and influenced the way artists have drawn the city hundreds of years after its completion.

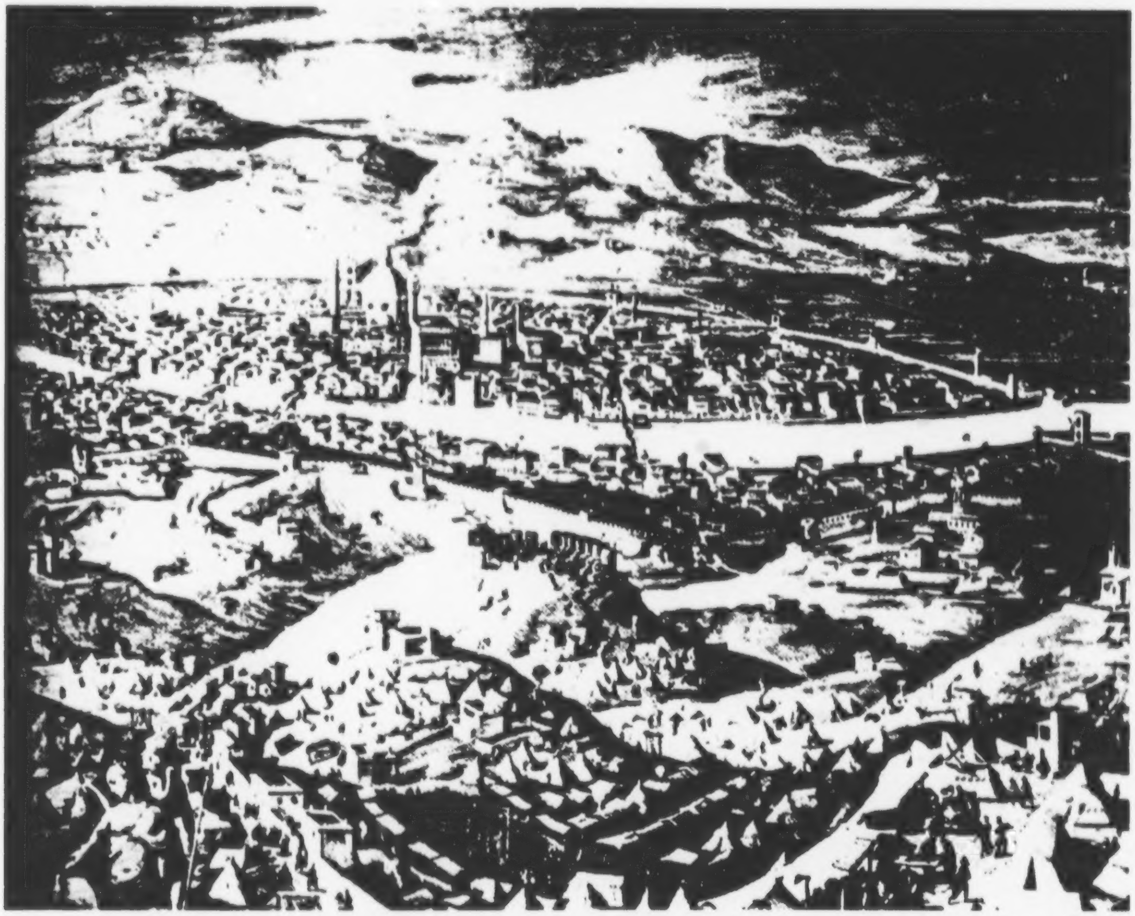

Figure One: Late 16th Century View of Florence by G. Vasari. Reproduced as published in Brunelleschi, by Giovanni Fanelli, copyright 1980, with the kind permission of Philip Wilson Publishers, Ltd.

18TH CENTURY VIEW OF FLORENCE

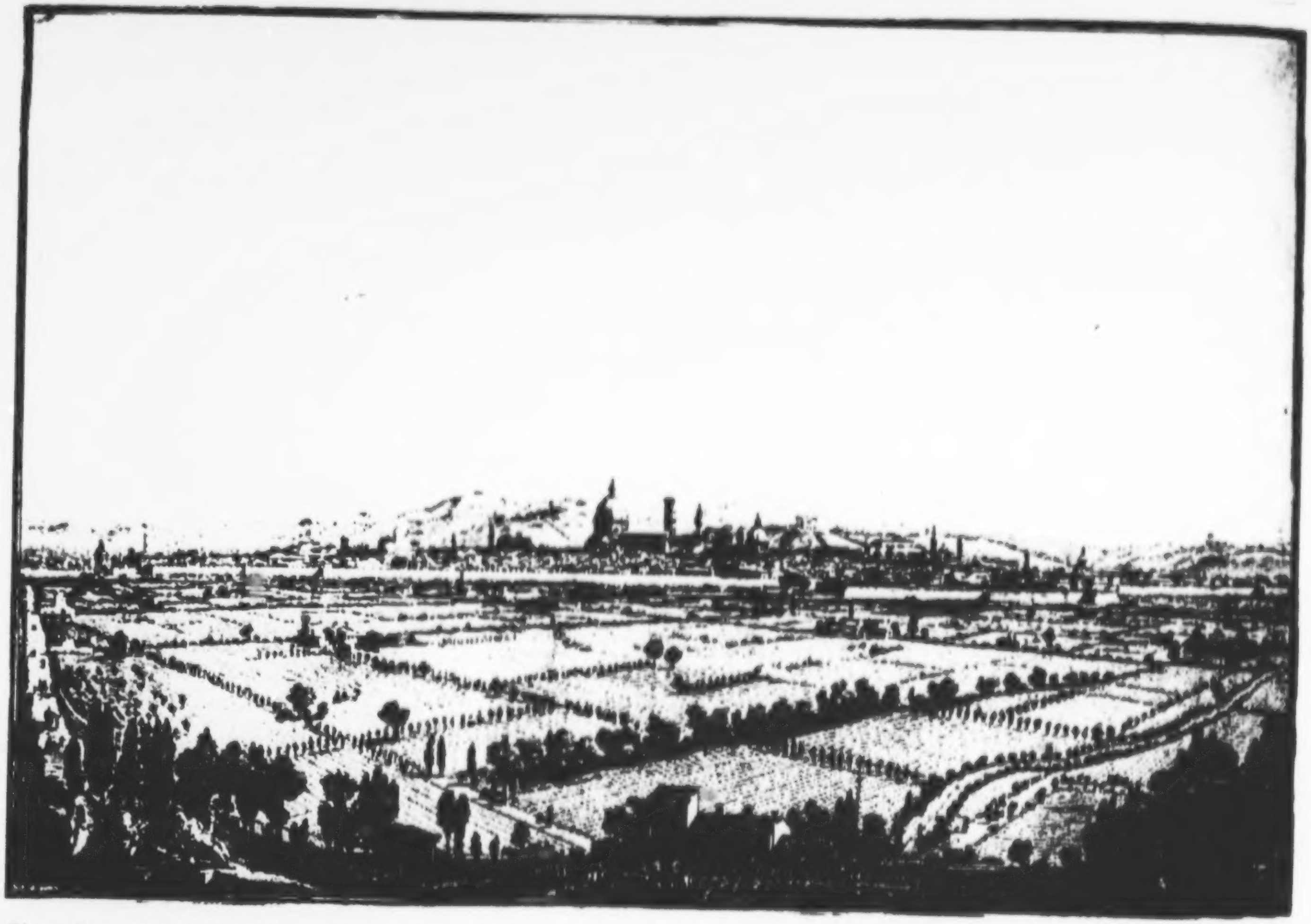

Figure Two: 18th Century View of Florence from the Capuchin Monastery in Montugu. Courtesy of the Pierpont Morgan Library, New York. 1952. 30:23.

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But the impact of this great architectural achievement goes well beyond the city of Florence and the surrounding countryside of Tuscany. Brunelleschi's work was the inspiration and starting point for a new architectural tradition of building vast majestic domes as symbols of political pride and religious faith. A century later Michelangelo, a Florentine by birth, who had grown up in the shadow of Brunelleschi's dome, designed the even grander and larger dome for the new cathedral of St. Peters, seat of the Popes in Rome. A century and a half after Michelangelo, Sir Christopher Wren built the huge dome of St. Paul's Cathedral in London to symbolize England's triumphant Protestant faith and newly won commercial might. (See *Figure Three*). So when the U.S. Capitol came to be built in Washington, D.C. it was natural that it should follow in the same tradition.

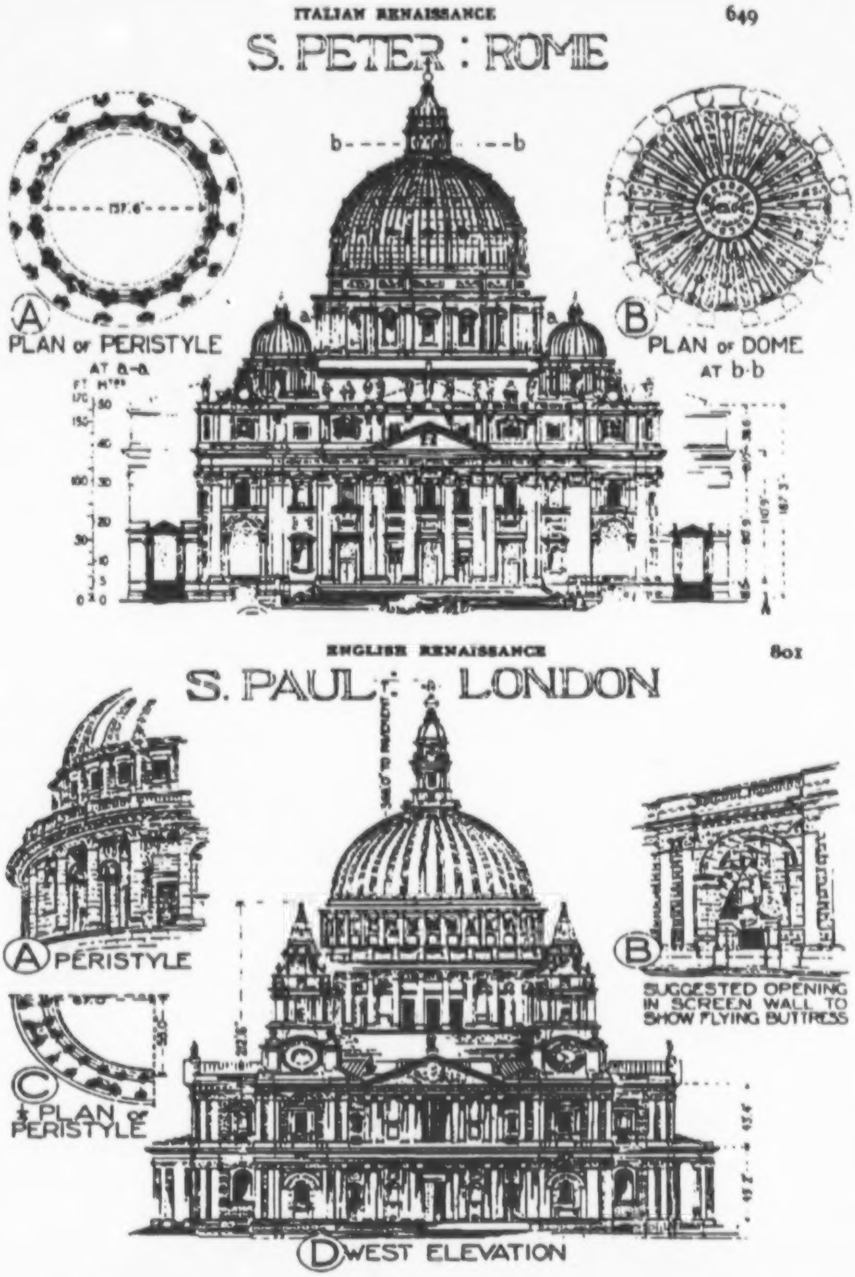
ITALIAN RENAISSANCE
649
S. PETER : ROME
A
PLAN OF PERISTYLE AT a-a
B
PLAN OF DOME AT b-b
ENGLISH RENAISSANCE
801
S. PAUL : LONDON
A PERISTYLE
B
SUGGESTED OPENING IN SCREEN WALL TO SHOW FLYING BUTTRESS
C
½ PLAN OF PERISTYLE
D WEST ELEVATION

Figure Three: St. Peter's Cathedral, Rome and St. Paul's Cathedral, London (Seventeenth Century). From A History of Architecture on the Comparative Method, by Sir Banister Fletcher, copyright 1896, B.T. Batsford, London.

STUDENT RESOURCE: STUDENT BACKGROUND FOUR

In America, the dome, as in the case of the Capitol, is very often the choice for grand public and civic buildings rather than churches. Perhaps in a country which is founded on the separation between church and state, a basic principle of our Constitution, we have transferred the most important symbolism to our governmental buildings rather than to our religious buildings. In any case, the capitol building in Washington D.C. is the most obvious example. It is a dome, which, like Brunelleschi's dome, hovers over the nation's Capitol and determines its spatial organization as well as its skyline. (See *Figure Four*). The Capitol dome also took many years to build. Just as work on Brunelleschi's dome continued despite political turmoil, wars and bouts of Plague, President Abraham Lincoln insisted that work on the Capitol dome continue even during the difficult times of the Civil War. In 1865, as the war ended, the dome reached completion. The Capitol Building symbolized the Union in the same way that the dome had symbolized the unity and power of Florence in the fifteenth century. Of such great symbolic importance are grand monuments in the minds of all of us.

Next time you go for a walk or a drive in your nearest town or city center, see if you can identify a dome in a significant building and think about what it represents.

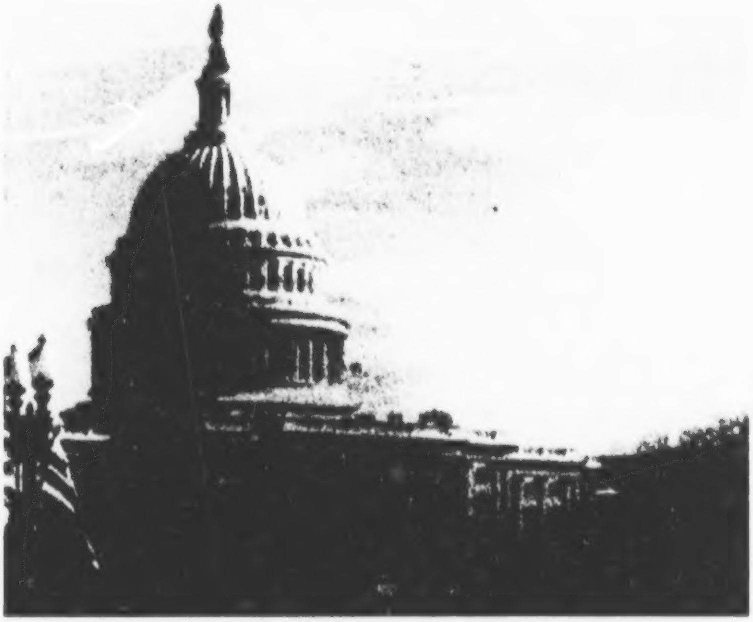

Figure Four: The Capitol Building, Washington, D.C.

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